

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL**  
**CENTRAL ZONE BENCH, BHOPAL,**  
**ORIGINAL APPLICATION NO. 176/2024**

**IN THE MATTER OF:**

**APOORV DWIVEDI**

**.....APPLICANT.**

**VERSUS**

**RUCHILIFE SCAPES WELFARE ASSOCIATION & Ors. ....RESPONDENT**

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Date: 03.11.2024

Place: Bhopal

**Submitted by MPPCB:-  
through Counsel**



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## REPORT

**Ref: Report of the Joint Committee in compliance to the Hon'ble NGT's order dated 29/07/2024 in the matter of Apoorv Dwivedi V/s Ruchilife Scapes Welfare Association & Ors. (OA No. 176/2024 (CZ)).: -**

Hon'ble NGT has issued following instructions on 29/07/2024 in the matter of Apoorv Dwivedi V/s Ruchilife Scapes Welfare Association & Ors. (OA No. 176/2024 (CZ)).: -

- “1. The issue raised in this application is extraction of groundwater without any authority in violation of Environmental Rules. Ruchi LifeScapes, a densely populated residential township located in Jatkhedi, Hoshangabad Road, Bhopal, consists of approximately 1000 independent units and 400 flats. Surrounded by other prominent townships like Swastik Grand, Mahindra, Golden City, and Village Jatkhedi, this locality is highly populated within a radius of 2.5 kilometers.*
- 2. Despite this centralized water supply, residents have increasingly begun extracting underground water independently. This trend, if continued, poses significant risks to the water table, potentially leading to severe water scarcity. This issue has been exacerbated over the last two summers, where the township already faced a critical shortage. The unregulated extraction could trigger a domino effect, encouraging similar behaviors in neighboring clusters, and escalating to a crisis level in the thickly populated Jatkhedi area.*
- 3. Despite availability of Narmada Water Supply, RuchiLifeScapes and neighboring societies have failed to secure a Narmada water supply connection, which would alleviate dependence on borewells. This failure has led to visible structural damage within the township, including split cemented roads and damaged boundary walls due to soil sinking.*
- 4. On 20.04.2024 up till 30.06.2024, Ruchi LifeScapes residents continued to drill bores during this ban, a violation ignored by the Welfare Association and Brightstar Infrastructure. Concerns were raised with the SDM Bhopal and Regional Director CGWA on*

*24.06.2024 but went unaddressed, leaving these bores, prima facie illegal, unsealed.*

*5. The contention of the applicant is that the extraction of groundwater is in violation of SoP issued by the Central Ground Water Authority and in violation of Public Trust Doctrine established in the case M.C. Mehta vs. Kamal Nath & Ors. AIR 1996 SC 711 and the order of NGT passed in Original Application No. 176/2015 titled as Shailesh Singh vs. Hotel Holiday Regency & Ors. and Arti vs. Central Groundwater Authority & Ors. 2017.*

*6. The uncontrolled and unmonitored extraction of groundwater may cause further risk as follows: -*

*i. The residential township is adjacent to an open sewer (Nala). Unregulated groundwater extraction in proximity to such an open sewer poses severe risks to the soil structure and increases the likelihood of soil contamination and subsidence. The environmental impact could be catastrophic, potentially leading to health hazards and structural damage to properties.*

*ii. Multiple borewells can lead to over extraction of groundwater, causing a drop in water tables and eventual depletion of local aquifers. This is particularly problematic in urban areas where recharge rates are low due to extensive concretization and reduced natural infiltration.*

*iii. Over Extraction of groundwater can lead to land subsidence, where the ground sinks due to the collapse of empty aquifers. This phenomenon has been observed in cities like Jakarta, Mexico City, and parts of California. In India, cities like Chennai and Kolkata are also at risk.*

*iv. Excessive drilling can result in contamination of groundwater sources. In coastal areas, over extraction can cause seawater intrusion, making the water saline and unfit for consumption or agriculture.*

*v. In residential townships, the sinking of land due to groundwater depletion can damage buildings, roads, and other infrastructure, leading to increased maintenance costs and potential safety hazards.*

*7. A substantial issue of environment has been raised.*

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*10. The matter requires consideration and requires SoP be prepared by the State Authority to regulate the extraction of groundwater.*

*...11. Accordingly, we direct the State Respondent and constitute a following committee to consider the matter and suggest for preparation of any draft SoP by the State. -*

*i. One representative from the Secretary (Environment) of State.*

*ii. One Representative from the Central Ground Water Authority.*

*iii. One Representative from the Central Pollution Control Board.*

*iv. One Representative from the State Pollution Control Board of the State.*

*...14. Standard Operating Procedure (SoP) prepared by the Department of Environment, Govt. of NCT of Delhi in light of the order dated 15.05.2020 passed in Original Application No. 685/2019, titled as Rakesh Kumar vs. Govt. of NCT of Delhi, may also be considered for guidance. If any SoP is applicable in the State, the committee may reconsider in light of the decreasing groundwater and excessive extraction of groundwater and in case of want of any SoP in the State, the committee may also prepare a standard SoP to regulate the uncontrolled extraction of water. The report so prepared may be filed within three months.*

In compliance to the order of Hon`ble NGT dated 29/07/2024, a joint committee consisting of the following officials of the concerned department has been constituted: -

No	Name of the Officer	Representative Department
1.	Smt. Anita Verma, Principal Architect, EPCO, Environment Department, Bhopal	Secretary (Environment) of Government Of MP
2.	Smt. Paisnee Patel, Scientist C and Dr. Sarita Tiwari Scientist C, CGWA, Bhopal.	Central Ground Water Authority, Bhopal
3.	Dr. Ranu Chouksey Verma, Scientist C, CPCB, RD, Bhopal.	Central Pollution Control Board, Bhopal
4.	Shri Brajesh Sharma, Regional Officer, RO, MPPCB, Bhopal.	MP Pollution Control Board, Bhopal

1. As per order dated 29/07/2024 of Hon'ble NGT, the committee has identified following points as ToR (Terms of Reference) of the committee to proceed as per order: -
  - a) To review the provisions of existing Standard Operating Procedure (SoP) of Ground water extraction.
  - b) To examine and resolve the issues related to decreasing groundwater and excessive extraction of groundwater in the area.

#### **A. INFORMATION PROVIDED BY CGWA**

2. Joint committee members organized a meeting on above points on 22/10/2024 and on 29/10/2024. During the discussions, the representative of Central Ground Water Authority (CGWA) informed the committee that a published Standard Operating Procedure (SoP) is available. The SoP is published in Gazette Notification dated 24/09/2020. A copy of the Gazette Notification is enclosed herewith **Annexure-I**. The guidelines were amended and published in Gazette Notification dated 29/03/2023. The copy of Gazette Notification dated 29/03/2023 is enclosed as **Annexure-II**. The SoP consists of guidelines to regulate and control ground water extraction in India. The committee reviewed the salient features of SoP mentioned in the gazette notification, which are mentioned as below: -

## **2.1 Salient features of Gazette Notification dated 24/09/2020: -**

- The categories of consumers exempted from seeking No Objection Certificate i.e. NOC for groundwater extraction are as follows: -
  - (i) Individual domestic consumers in both rural and urban areas for drinking water and domestic uses.
  - (ii) Rural drinking water supply schemes.
  - (iii) Armed Forces Establishments and Central Armed Police Forces establishments in both rural and urban areas.
  - (iv) Agricultural activities.
  - (v) Micro and small Enterprises drawing ground water less than 10 cum/day.
- State / Ut Governments shall be responsible for registering drilling rigs operating within their jurisdiction and for maintaining the database of wells drilled by them.
- The notification covers sectors like Drinking & Domestic use for Residential apartments/ Group Housing Societies, Agricultural sectors, Industrial Use, Mining Projects, Infrastructure Projects.
- The specific conditions regarding the drinking & domestic use for residential apartment/ group housing society/ government water supply agencies in urban areas for which No Objection Certificate shall be granted are as under:
  - Installation of Sewage Treatment Plants shall be mandatory for all residential apartments/ Group Housing Societies where ground water requirement is more than 20 m<sup>3</sup>/day. The water from Sewage Treatment Plants shall be utilized for toilet flushing, car washing, gardening etc.
  - The No Objection Certificate shall be valid for a period of five years from the date of issue or till such time local Government water supply is provided to the project area, whichever is earlier. In case the project proponent receives water supply from the concerned local Government Water Supply Agency during the validity of the No Objection

Certificate, intimation regarding availability of public water supply shall be sent by the project proponent to CGWA and No Objection Certificate will be cancelled by the Authority. In other cases, the project proponent will apply for renewal of No Objection Certificate, 90 days (ninety days) before the expiry of No Objection Certificate.

- Proponents shall be liable to pay ground water abstraction charges for the quantum of ground water proposed to be extracted, as per rates mentioned in SoP.
- All residential apartments/ group housing societies/ Government water supply agencies in urban areas shall be required to pay ground water abstraction charges. All industries/mining/ infrastructure projects drawing ground water in safe, semi-critical and critical assessment units will have to pay ground water abstraction charges based on quantum of ground water extraction and category of assessment unit as per details given in this guideline. The rates of Ground water abstraction /restoration charges for different categories based on the quantum of groundwater withdrawal are mentioned in the gazette notification.
- All private tankers abstracting ground water and using it for supply as bulk water suppliers will now mandatorily seek No Objection Certificate for ground water abstraction. The “bulk water suppliers” through tankers drawing ground water in safe, semi-critical and critical assessment units shall pay groundwater abstraction charges as mentioned in the gazette notification.
- The general compliance conditions in NOC are as under:
  - Installation of digital water flow meter (conforming to BIS/ IS standards) having telemetry system in the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days (thirty days) of grant of No Objection Certificate through the web-portal.
  - Proponents shall mandatorily get water flow meter calibrated on from an authorized agency once in a year.

- Proponents shall install roof top rain water harvesting & recharge systems in the project area.
- Proponents shall pay Ground Water Abstraction/ Restoration Charges based on quantum of ground water extraction as applicable as per the rates.
- Construction of purpose-built observation wells (piezometers) for ground water level monitoring shall be mandatory as per Section 15. Water level data shall be made available to CGWA through web portal.
- Proponents shall monitor quality of ground water from the abstraction structure(s) once in a year. Water samples from bore wells/ tube wells / dug wells shall be collected during April/May every year and analysed in NABL accredited laboratories for basic parameters (cations and anions), heavy metals, pesticides/ organic compounds etc. Water quality data shall be made available to CGWA through the web portal.
- If the existing well becomes defunct due to mechanical failure within the validity period of No Objection Certificate, the user can construct a replacement well under intimation to CGWA on web portal. The defunct well shall be properly sealed. The user will be required to submit documentary proof in this regard. However, if the existing abstraction structures fails to yield water and the proponent desires to drill another tubewell in the same premises, prior permission of the Authority shall be required. If the replacement well is to be drilled in some different place, the proponent shall obtain fresh No Objection Certificate.
- Wherever feasible, requirement of water for greenbelt (horticulture) shall be met from recycled / treated waste water.
- In case of change of ownership, new owner of the industry will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.
- Central Ground Water Authority has appointed the District Magistrate/ District Collector/ Sub Divisional Magistrates of

each Revenue District/Sub division as Authorized Officers, who have been delegated the power to seal illegal wells, disconnect electricity supply to the energized well, launch prosecution against offenders etc. including grievance redressal related to ground water in their respective jurisdictions.

## **2.2 Salient features of Gazette Notification dated 29/03/2023: -**

- The guidelines were amended and published in Gazette Notification dated 29/03/2023. The main amendments related to ground water extraction are as under:

*“2. In the said guidelines, in the paragraph 1.0, after clause (v), clauses (vi), (vii) shall be added namely: -*

*“(vi) All industries/ mining projects/ infrastructure projects drawing ground water only for drinking/ domestic purposes up to 5 Cum /day in all assessment units.*

*(vii) Residential Apartments and Group Housing Societies:*

*(a) For drinking water and domestic uses, drawing ground water upto 20 m<sup>3</sup>/day subject to the conditions mentioned in Para 2.0 of the guidelines.*

*(b) Dwelling units for Economically Weaker Sections (EWS) under Government schemes.”.*

*3. In the said guidelines, in the paragraph 2.0: -*

*(i). Sub-para 2 shall be added namely:-*

*“Installation of digital water flow meter (conforming to BIS/ IS standards) in all abstraction structure(s) shall be mandatory for all Residential Apartments and Group Housing Societies. All Residential Apartments and Group Housing Societies having swimming pools drawing ground water shall be mandatorily required to seek No Objection Certificate.*

*(iii). for the clause (e), the following clause shall be substituted, namely: -*

*“e) Copy of Rain Water Harvesting Plan submitted to Government*

*agency by the applicant or a proposal for rain water harvesting/ recharge in the project premises as per the prevailing Model Building Bye Laws issued by Ministry of Housing & Urban Affairs, Government of India.”.*

12. In the paragraph 9.0: -

(i). for clause (i), the following clause shall be substituted, namely:

-

*“(i). Installation of tamper proof digital water flow meter/ Pre-Paid Meter (s) (conforming to BIS/ IS standards) having telemetry system in the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate through the web-portal.*

*In case the ground water extraction is from multiple bore/tube wells within the same premises, tamper-proof digital water flow meter(s)/Pre-Paid Meter (s) with telemetry can be installed at common outlet point(s).”*

- The Annexure- VIII of amended rules in Gazette Notification published in 29/03/2023 lists the States/Union territories where ground water extraction is being regulated by Central Ground Water Authority which has State of Madhya Pradesh included in it.
- After reviewing the above guidelines, the committee is of the opinion that the existing SoP covers all the relevant issues regarding the excessive ground water extraction thoroughly.
- As per SoP in the paragraph 1.0, in clause (i), *“Individual domestic consumers in both rural and urban areas for drinking water and domestic uses”* are exempted from seeking No Objection Certificate for ground water extraction.

## **B) THE SITE VISIT**

- The joint committee members visited the township Ruchi LifeScapes, Bhopal on 22/10/2024. The Ruchi LifeScapes is a residential township located at Jatkhedi, Phanda Block,

Hoshangabad Road, Bhopal. Apart from the joint committee members following officers namely Dr. V.K. Kulshrestha, Scientist C, CGWA Bhopal, Ms. Prakamya Tiwari, Assistant Engineer, Regional Office, MPPCB, Bhopal, were present during the field visit. The committee first visited the site office located inside the Ruchi LifeScapes residential township. It is informed by the representatives present at the office that this is the site office of builder company M/s Bright Star Infrastructure (P) Ltd., Bhopal. During visit Shri Hemant Kumar Saran, Accounts Officer, and Shri Sarvesh Mishra, Civil Incharge were present in the office. The Geographical locations, photographs and visual observations were recorded during visit. The Photographs are enclosed as **Annexure-III**. The information provided by the company representative during visit are mentioned as below: -

- The township Ruchi LifeScapes is located at Jatkhedi, Hoshangabad Road, Phanda Block, District –Bhopal.
- The geographical location of the site is latitude 23° 10' 27.68" N and longitude 77° 28' 44.70" E.
- The township spreads over approximately 85-acres land having approximately 504 flats, 221 plots and 714 duplexes, flats and plots.
- Currently, the water supply of township is managed by M/s Brightstar Infrastructure Private Limited. It is also confirmed by the representatives that some of residents have installed their own tube wells in the colony.
- M/s Brightstar Infrastructure Private Limited informed that they have not provided any permission for individual residents for digging of tube wells.
- As per representative of M/s Brightstar Infrastructure Private Limited, the township will be handed over to RuchilifeScapes Welfare Association up to December 2024.
- The representatives of M/s Brightstar Infrastructure Private Limited provided the approval dated 15/05/2008 from Town and Country and Planning Department, NOC dated 15/12/2008 from Central Ground Water Authority,

registration certificate dated 04/08/2007 from Nagar Palika Nigam Bhopal, colony development permission dated 08/10/2008 from Nagar Palika Nigam Bhopal. Copies of above permissions are enclosed herewith as **Annexure- IV**.

- There are 2 underground tanks each having capacity of 1.368 lakh liters for use of flats/apartments. For the remaining area 3 underground tanks having capacity of 3.72 lakh liters, 3.72 lakh liters and 3.36 lakh liters respectively with 3 overhead tanks having capacity of 1.2 lakhs liters each.
- There are 3 tube wells for water supply and water recharging facility has also been provided along the road side using 12 pits present for ground water recharge.
- During field visit, some pits were found filled with silt and garbage.
- It is informed by the representatives of M/s Brightstar Infrastructure Private Limited that sufficient water supply is provided to the township by individual connections through overhead tanks.
- The NOC was given to the M/s Brightstar Infrastructure Private Limited by CGWA, Bhopal dated 15/12/2008. A copy of the NOC is enclosed herewith as **Annexure-V**.

**C) ACTION TAKEN BY CENTRAL GROUND WATER AUTHORITY: -**

- In reference to the complaint received from Shri Apoorv Dwivedi dated 24/06/2024, a letter vide letter no. 146 dated 15/07/2024 was issued to District Collector, Bhopal by Central Ground Water Authority (CGWA), Bhopal regarding the unauthorized groundwater abstraction by residents of Ruchi LifeScapes, Jatkhedi, Hoshangabad Bhopal to take enforcements measure. A copy of the letter is enclosed herewith as **Annexure-VI**.

- A Showcause Notice bearing no. 207 dated 28/10/2024 was issued to M/s Brightstar Infrastructure Private Limited regarding ground water abstraction 15 days were given to furnish an explanation to M/s Brightstar Infrastructure Private Limited. A copy of showcause notice is enclosed herewith as **Annexure-VII**.

## **D) DYNAMIC GROUND WATER RESOURCES OF MADHYA PRADESH, 2023**

Joint committee also reviewed the report titled as "Dynamic Ground Water Resources Of Madhya Pradesh, 2023" jointly prepared by Ground Water Survey, Water Resources Department, Government of Madhya Pradesh and Central Ground Water Board, North Central Region, Bhopal. In this report the status of ground water extraction is given for the whole State of Madhya Pradesh. A copy is enclosed herewith as **Annexure-VIII**. The annual status of ground water recharge and extraction is given as under:

1. Total Annual Ground Water Recharge (BCM) : 35.47
2. Annual Extractable Ground Water Resource (BCM): 32.85
3. Annual Ground Water Extraction (BCM) : 19.30
4. Stage of Ground Water Extraction (%) : 58.75

In the Chapter 6 of the report, the recommendations for the recharge of ground water resource are given at point no 6.2. The same is reproduced as under:

### **"6.2 RECOMMENDATIONS**

The dependency on groundwater has increased many folds during the recent years and the groundwater extraction for irrigation, domestic and industries have resulted in lowering of water levels, long-term water level declining trend and even drying up of wells. The best option lies in improving the recharge component in any well-defined administrative or natural boundary (Block/ Water shed) by an integrated scientific approach with people participatory program. Such program also

needs to include cost effective structures and best practices possible without deteriorating the existing surface and ground water resources in terms of quantity and quality. In order to regulate the groundwater extraction, Central Ground Water Board in association with Ground Water Survey, Water Resource Department has computed Dynamic Groundwater Resources and categorized blocks as Over Exploited, Critical, Semi Critical and Safe. Hence, there is an urgent need to implement artificial recharge schemes to augment ground water so that artificial recharge would be a part of Sustainable Management of ground water. The guidelines which can be used in the formulation of scheme proposal can be enumerated as follows.

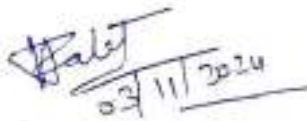
Criteria for selection of priority area

1. Area characterized by significant declining post monsoon long term water level trend
2. Area characterized by deeper post monsoon water level.
3. The area having high stage of groundwater extraction and categorized as Over Exploited, Critical ground water assessment units.
4. The aquifer under stress needs to be considered for artificial recharge specially the weathered, fractured and jointed basaltic formations of malwa regions and priority also be given for recharging at the recharge area of the confined aquifer, viz., crystalline sedimentary contacts, palaeo-channels, upstream side of fractures/lineaments.”

**E) OBSERVATIONS OF THE JOINT COMMITTEE: -**

Joint committee has reviewed the Standard Operating Procedure (SoP) published in Gazette Notification dated 24/09/2020 and amendment dated 29/03/2023 and also reviewed the report of Dynamic Ground Water Resources Of Madhya Pradesh, 2023. It is observed that the relevant provisions have been made in the SoPs for the conservation and extraction of ground water. The implementation mechanism is also defined in the SoP.

The report of Dynamic Ground Water Resources of Madhya Pradesh, 2023 has addressed the issues related to the extraction of ground water and its recharge. The same may be considered for conservation of ground water.



03/11/2024

**Paisnee Patel**  
Scientist C,  
CGWA, Bhopal



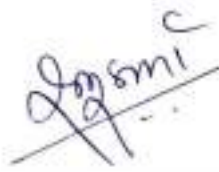
03/11/2024

**Dr. Sarita Tiwari**  
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03/11/2024

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03/11/2024

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03/11/2024

**Anita Verma**  
Principal  
Architect, EPCO,  
Environment  
Department,  
Bhopal



# भारत का राजपत्र The Gazette of India

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असाधारण  
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)  
PART II—Section 3—Sub-section (ii)

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NEW DELHI, THURSDAY, SEPTEMBER 24, 2020/ASVINA 2, 1942

जल संसाधन, नदी विकास और गंगा संरक्षण विभाग

(केंद्रीय भूमि जल प्राधिकरण)

अधिसूचना

नई दिल्ली, 24 सितम्बर, 2020

का.आ. 3289(अ).—जबकि, 1985 की सिविल रिट याचिका 4677, एमसी. मेहता बनाम भारत संघ में पारित दिनांक 10 दिसंबर, 1996 के माननीय उच्चतम न्यायालय के आदेश के माध्यम से इसके दिशा-निर्देशों पर केंद्र सरकार ने भूमि जल प्रबंधन और विकास के विनियमन और नियंत्रण के उद्देश्यों से और कतिपय शक्तियों का प्रयोग करने और उससे संबंधित कतिपय कार्यों को करने के लिए पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 5 के तहत शक्तियों का प्रयोग करने के लिए दिनांक 14 जनवरी, 1997 की अधिसूचना सं.का.आ. 38(अ) के माध्यम से केंद्रीय भूमि जल प्राधिकरण (इसके बाद इसे "प्राधिकरण" के रूप में कहा गया है) गठित किया है।

और जबकि प्राधिकरण उद्योगों, अथवा आधारभूत परियोजनाओं अथवा खनन परियोजनाओं इत्यादि के लिए भूजल निष्कर्षण के लिए "अनापत्ति प्रमाणपत्र" जारी करके भूजल विकास और प्रबंधन को विनियमित करता रहा है और बाइस राज्यों और दो संबंधित संघ शासित क्षेत्रों में, जहां पर भूजल विकास संबंधित राज्य सरकारों तथा संघ शासित प्रशासनों द्वारा विनियमित नहीं किया जा रहा है, समय-समय पर इस संबंध में इसने दिशा-निर्देश तैयार किये थे।

और जबकि, कुछ राज्य सरकारों अथवा, संघ शासित क्षेत्रों ने विधान अधिनियमित किए हैं और भूजल विकास और प्रबंधन को विनियमित करनेकेलिए विनियामक दिशा-निर्देश अथवा आदेश जारी किए हैं।

और जबकि, माननीय राष्ट्रीय हरित अधिकरण, नई दिल्ली ने 2014 की ओ.ए. सं. 204/205/206 में दिनांक 15 अप्रैल 2015 के आदेश के माध्यम से प्राधिकरण को निर्देश जारी किए हैं कि वह सुनिश्चित करें कि ऐसे किसी भी व्यक्ति जो भूजल निष्कर्षण के लिए ट्यूबवेल, अथवा कोई अन्य साधन संचालित कर रहा है, को प्राधिकरण से अनुमति प्राप्त करनी

होगी और वह इसे लागू कानून की शर्त पर संचालित करेगा चाहे ऐसी यूनिट मौजूद यूनिट हो अथवा यूनिट को अभी स्थापित करना हो;

और जबकि, उक्त माननीय अधिकरण ने 2014 की ओ ए सं. 34 और 37 में दिनांक 09 जुलाई 2015 को अपने आदेश के माध्यम से सभी औद्योगिक इकाइयों को, जो सामान्य बहिर्घाव परिशोधन संयंत्र (सीईटीपीएस) की सदस्य हैं, कानून के अनुसार “अनापत्ति प्रमाणपत्र” प्राप्त करने के लिए राज्य प्रदूषण नियंत्रण बोर्ड के माध्यम से प्राधिकरण से संपर्क करने के निर्देश दिए हैं;

और जबकि, माननीय अधिकरण ने 2014 के ओ.ए सं. 200 में दिनांक 13 जुलाई, 2017 के आदेश के माध्यम से निर्देश दिए कि प्रत्येक उद्योग को ऐसे जल की निकासी के लिए भुगतान करने के निर्देश दिये जाने चाहियें और वह भी, कि यह ऐसी जल निकासी की अनुमति देने के आदेश में बताई गई शर्तों के अनुरूप हो।

और जबकि, उक्त माननीय अधिकरण ने क्रमशः 2015 की ओ.ए. सं. 176 और 2012 की 59 में दिनांक 28 अगस्त 2018 के अपने आदेश में जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय को भूजल संसाधनों के संरक्षण के लिए प्रभावी कदम सुनिश्चित करने के लिए मौजूदा तंत्र की आगे समीक्षा करने के निर्देश दिए;

और जबकि, माननीय राष्ट्रीय हरित अधिकरण के निर्देशों और पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 और धारा 5 की उप धारा (3) के तहत प्रदत्त शक्तियों के अनुसरण में प्राधिकरण ने भूजल संसाधनों के बचाव की दृष्टि से 11 अक्टूबर, 2017 को “अनापत्ति प्रमाणपत्र” प्रदान करने के लिए प्रारूप दिशा-निर्देश परिचालित किये जिसमें सभी स्टेकहोल्डरों से टिप्पणियां और सुझाव मांगे गए।

और जबकि, उक्त प्रारूप दिशा-निर्देश के प्रत्युत्तर में प्राप्त सभी आपत्तियों और सुझावों पर केंद्र सरकार द्वारा विधिवत रूप से विचार किया गया है, प्राधिकरण दिनांक 12 दिसंबर, 2018 की अधिसूचना सं.का.आ. 6140 (अ) के माध्यम से देश में भूजल के अति-दोहन को विनियमित करने और भूजल संसाधनों के संरक्षण के दिशा-निर्देश अधिसूचित किए;

और जबकि, उक्त माननीय अधिकरण ने 2015 की ओ ए. सं. 176 में दिनांक 03 जनवरी, 2019 के आदेश के माध्यम से निर्देश दिए थे कि दिनांक 12 दिसंबर, 2018 की उपर्युक्त अधिसूचना को लागू नहीं किया जा सकता, क्योंकि यह स्थाई नहीं है यदि इसकी “पूर्वोपाय सिद्धांत सतत विकास और अंतर-उत्पादन इक्विटी सिद्धांतों” पर जांच की जाती है तो यह स्थाई नहीं है और यदि यह कार्यान्वित की जाती है, तो भूजल में बहुत तेजी से गिरावट आएगी और जल निकाय क्षतिग्रस्त हो जाएंगे और भारत के संविधान के अनुच्छेद 21 के तहत जीवन के मौलिक अधिकार का हनन होगा;

और जबकि, माननीय अधिकरण ने दिनांक 11 सितंबर, 2019 के आदेश के माध्यम से भूजल की गिरावट को रोकने के लिये, गैर अधिकृत जल निष्कासन के विरुद्ध सख्त मॉनीटरिंग तंत्र और “अनापत्ति प्रमाणपत्र” शर्तों को पूरा करने, पर्यावरण क्षतिपूर्तिइत्यादि पर चर्चा करने के लिए एक समिति गठित की है और इस पर रिपोर्ट प्रस्तुत करने को कहा गया है;

और जबकि, उक्त समिति ने भूजल निष्कर्षण को विनियमित करने और भूजल संरक्षण के प्रारूप दिशा-निर्देशों सहित रिपोर्ट दिनांक 16 मार्च, 2020 को माननीय अधिकरण में प्रस्तुत कर दी है;

और जबकि, उक्त माननीय अधिकरण ने दिनांक 20 जुलाई, 2020 के अपने आदेश के माध्यम से प्राधिकरण द्वारा वाणिज्यिक स्थापनाओं को “अनापत्ति प्रमाणपत्र” जारी करते समय सतत भूजल प्रबंधन के लिए कतिपय बिन्दुओं के साथ अनुकरण करने का निर्देश दिया है;

अब इसलिए माननीय राष्ट्रीय हरित अधिकरण के दिशा-निर्देशों और पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 की 29) की धारा 5 के साथ पठित धारा 3 की उपधारा (3) द्वारा प्रदत्त शक्तियों के अनुकरण में जल संसाधन, नदी विकास और गंगा संरक्षण विभाग एतद द्वारा नीचे दी गई अधिसूची के अनुसार इस मंत्रालय की अधिसूचना का.आ. 6140 (अ), दिनांक 12 दिसंबर, 2018 का अधिकरण करके देश में भूजल निकासी को विनियमित और नियंत्रित करने के दिशा-निर्देश अधिसूचित करता है।

**अनुसूची**  
**भारत में भूजल निकासी को विनियमित और नियंत्रित करने के दिशा-निर्देश**  
**(तत्काल प्रभाव से)**

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[फा. सं. सीजीडब्ल्यूए-21/4/2020- सीजीडब्ल्यूए]

आशीष कुमार, निदेशक

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**भारत में भूजल निकासी को विनियमित और नियंत्रित करने के दिशा-निर्देश****प्रस्तावना और पृष्ठभूमि सूचना:**

एमसी मेहता बनाम भारत संघ की 1985 की सिविल रिट याचिका सं. 4677 में जारी दिनांक 10 दिसंबर, 1986 के माननीय उच्चतम न्यायालय के आदेश के माध्यम से इसके दिशा-निर्देशों पर केंद्र सरकार ने भूजल प्रबंधन और विकास के विनियमन और नियंत्रण के उद्देश्यों और उक्त अधिनियम के अनुसार कतिपय शक्तियों का प्रयोग करने और कतिपय कार्य करने के लिए पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 5 के तहत शक्तियों का प्रयोग करने के लिए 14 जनवरी, 1997 की अधिसूचना सं.का.आ. 38 (अ) के माध्यम से केंद्रीय भूमि जल बोर्ड को प्राधिकरण के रूप में गठित किया है।

प्राधिकरण उद्योगों अथवा अवसंरचनात्मक परियोजनाओं अथवा खनन परियोजनाओं इत्यादि के लिए भूजल निकासी के लिए 'अनापत्ति प्रमाणपत्र' जारी करके भूजल विकास और प्रबंधन को विनियमित कर रहा है और 22 राज्यों और 2 यू टी में, जहां राज्य सरकार, संबंधित यू टी प्रशासनों द्वारा भूजल विकास विनियमित नहीं किया जा रहा है, लागू इस संबंध में समय समय पर दिशा-निर्देश तैयार किए हैं।

देश में जल के संसाधन के सतत विकास के लिए देश में भूजल निकासी को विनियमित करने और कम भूजल संसाधनों को संरक्षित करने के लिए भूजल निकासी दिशा-निर्देश तैयार किए गए हैं।

ये दिशा-निर्देश राजपत्र अधिसूचना की तारीख से तत्काल प्रभावी होंगे और केंद्रीय भूमि जल प्राधिकरण (सीजीडब्ल्यूए) द्वारा जारी पहले के सभी दिशा-निर्देश के स्थान पर होंगे।

ये दिशा-निर्देश पैन-इंडिया में लागू होंगे। राज्य/संघ राज्य क्षेत्र (जो भूजल निकासी को विनियमित नहीं कर रहे हैं) में भूजल निकासी केंद्रीय भूमि जल प्राधिकरण द्वारा विनियमित की जानी जारी रखी जाएगी।

इसके अलावा, जिन राज्यों/संघ राज्य क्षेत्रों के अपने भूजल निकासी दिशा-निर्देश हैं, जो सीजीडब्ल्यूए के अनुरूप नहीं हैं, वहां सीजीडब्ल्यूए के दिशा-निर्देशों के प्रावधान लागू होंगे। तथापि यदि ऐसे राज्यों/संघ राज्य क्षेत्रों द्वारा अनुसरण किए जाने वाले दिशा-निर्देशों में सीजीडब्ल्यूए के दिशा-निर्देशों से अधिक कठोर प्रावधान हैं, तो वहां सीजीडब्ल्यूए के दिशा-निर्देशों में निहित प्रावधानों के अलावा राज्य/संघ राज्य क्षेत्र के प्राधिकरणों द्वारा उन प्रावधानों को भी लागू किया जाएगा। राज्य स्थानीय जल-भूवैज्ञानिक स्थितियों के आधार पर अतिरिक्त शर्तों/मानदंडों का सुझाव देने के लिए स्वतंत्र हो सकते हैं, जिसकी स्वीकार करने से पहले सीजीडब्ल्यूए/जल शक्ति मंत्रालय, भारत सरकार द्वारा समीक्षा की जाएगी।

सभी नए/ मौजूद तथा विस्तार माँगने वाले उद्योगों, अवसंरचनात्मक परियोजनाओं और खनन परियोजनाओं को, जब तक कि पैरा 1.0 के अंतर्गत इसे विशिष्ट रूप से छूट प्राप्त न हो, वेब आधारित एप्लीकेशन प्रणाली के माध्यम से अनापत्ति प्रमाण पत्र (एनओसी) प्राप्त करना अपेक्षित होगा।

जल प्रबंधन योजनाएं अतिदोहित यूनिटों के साथ शुरू करके सभी अतिदोहित, गंभीर और अर्ध-गंभीर मूल्यांकन यूनिटों के लिए सभी राज्य भूजल प्राधिकरणों/संगठनों द्वारा तैयार की जाएंगी। जल प्रबंधन योजनाओं की समीक्षा की जाएगी और यह आवधिक रूप से अद्यतन की जाएंगी। इस संबंध में तैयार जल प्रबंधन योजनाएं जल उपलब्धता और कमी के आंकड़े तथा नीति केन्द्रीय भूमि जल प्राधिकरण/राज्य भूमि जल प्राधिकरण की वेबसाइटों पर दर्शाई जाएगी।

## 1.0 एनओसी प्राप्त करने से छूट:

उपभोक्ताओं की निम्नलिखित श्रेणियों को भूजल निकासी के लिए एनओसी प्राप्त करने से छूट दी जाएगी:

- (i) पेयजल और घरेलू उपयोग के लिए ग्रामीण और शहरी दोनों क्षेत्रों में वैयक्तिक घरेलू उपभोक्ता।
- (ii) ग्रामीण पेयजल आपूर्ति स्कीमें।
- (iii) ग्रामीण और शहरी दोनों क्षेत्रों में सशस्त्र बलों के प्रतिष्ठान और केन्द्रीय सशस्त्र पुलिस बल।
- (iv) कृषि कार्यकलाप।
- (v) 10 सी यू एम / दिन से कम भूजल का आहरण करने वाले माइक्रो और स्माल उद्योग।

### 1.1 ड्रिलिंग रिगों का पंजीकरण

राज्य/संघ राज्य सरकारें अपने क्षेत्राधिकार में संचालित ड्रिलिंग रिगों के पंजीकरण और उनके द्वारा ड्रिल किए गए कुओं के डेटाबेस के रख-रखाव के लिए जिम्मेदार होंगी। सीजीडब्ल्यूए को आंकड़े उपलब्ध कराने के लिए सीजीडब्ल्यूए पोर्टल में उपयुक्त लिंक दिए जाएंगे।

## 2.0 शहरी क्षेत्रों में रेजीडेंसियल अपार्टमेंट/ग्रुप हाउसिंग सोसाइटी/सरकारी जलापूर्ति एजेंसियों के लिए पेय और घरेलू प्रयोग के लिए जल

भूजल निकासी के लिए अनापत्ति प्रमाण पत्र (एनओसी) देने के लिए परियोजना प्रस्तावक को सीजीडब्ल्यूए वेबसाइट में उपलब्ध उपयुक्त फॉर्मेट में सीजीडब्ल्यूए द्वारा जारी दिशा-निर्देशों के अनुसार ब्यौरा भेजना होता है। नए/मौजूदा कुओं के लिए एनओसी केवल ऐसे मामलों में ही दिया जाता है, जहां स्थानीय सरकारी जलापूर्ति एजेंसी उस क्षेत्र में अपेक्षित मात्रा में जल की आपूर्ति करने में सक्षम नहीं है।

एनओसी तभी दिया जाएगा बशर्ते कि निम्नलिखित विशिष्ट शर्तें पूरी हों:

- i) सीवेज परिशोधन संयंत्रों का संस्थापन सभी रेजीडेंसियल अपार्टमेंट/ग्रुप हाउसिंग सोसाइटी के लिए अनिवार्य होगा जहां भूजल, की आवश्यकता 20 घनमीटर/दिन से अधिक है। एसटीपी का जल शौचालय फ्लशिंग, कार धोने, बागवानी इत्यादि के लिए उपयोग किया जाएगा।
- ii) यह एनओसी जारी होने की तारीख से 5 वर्षों की अवधि अथवा परियोजना क्षेत्र के लिए स्थानीय सरकार द्वारा जलापूर्ति करने के समय तक, जो भी पहले हो, वैध होगा। यदि परियोजना प्रस्तावक एनओसी की वैधता के दौरान संबंधित स्थानीय सरकार से जलापूर्ति प्राप्त करता है, तो परियोजना प्रस्तावक को सीजीडब्ल्यूए को जलापूर्ति की उपलब्धता के संबंध में सूचित करना होगा और प्राधिकरण द्वारा एनओसी रद्द कर दिया जाएगा। अन्य मामलों में परियोजना प्रस्तावक एनओसी की समाप्ति के 90 दिनों से पहले एनओसी के नवीकरण के लिए आवेदन करेगा।
- iii) प्रस्तावक को तालिका 6.1 में उल्लिखित दरों के अनुसार जल निकासी के प्रस्तावित भूजल के लिए भूजल निकासी प्रभार का भुगतान करना होगा।

### आवेदन के साथ प्रस्तुत किए जाने वाले दस्तावेज

- क) फ्लाशिंग इत्यादि के लिए पुनः चक्रित/परिशोधित जल के पुनः प्रयोग को ध्यान में रखते हुए राष्ट्रीय भवन कोड, 2016 (अनुलग्नक-1) के अनुसार अपेक्षित जल के ब्यौरे।

- ख) आवेदक द्वारा 10/- रु. के गैर-न्यायिक स्टैप पर हलफनामा जिसमें पेय/घरेलू उपयोग के लिए 10 घनमीटर/दिन तक उपभोक्ता की भूजल की आवश्यकता होने की स्थिति में लोक जलापूर्ति की गैर/अपर्याप्त उपलब्धता की पुष्टि की जाये।
- ग) पेय/घरेलू उपयोग के लिए 10 घनमीटर/दिन से अधिक भूजल आवश्यकता के मामलों में स्थानीय सरकारी जलापूर्ति एजेंसियों को एनओसी के लिए आवेदन करते समय कार्यान्वित की जाने वाली स्कीम/प्रस्तावित परियोजना के लिए सरकारी अनुमोदन की प्रति प्रस्तुत करनी होगी।
- घ) किसी भी नेशनल अक्रेडिशन बोर्ड फौर टेस्टिंग एंड कैलिब्रेशन लैबोरेटरी (एनएबीएल) से प्रत्यायित प्रयोगशाला अथवा सरकार से अनुमोदित प्रयोगशाला से (एनओसी के लिए आवेदन कर रही मौजूदा परियोजनाओं के मामले में) मौजूदा बोरवेल/ट्यूबवेल के भूजल गुणवत्ता आंकड़े।
- ड.) आवास और शहरी कार्य मंत्रालय द्वारा जारी मॉडल भवन उपनियमों के अनुसार क्षेत्र के भीतर वर्ष जल संचयन/पुनर्भरण के लिए प्रस्ताव।

### 3.0 कृषि क्षेत्र

कृषि क्षेत्र भारतीय अर्थव्यवस्था की रीढ़ की हड्डी है। वर्ष 2013-14 की लघु सिंचाई गणना के अनुसार 87.86 प्रतिशत कुएं 4 हेक्टेयर तक की भूमि वाले सीमान्त, लघु और अर्ध-मध्यम किसानों के हैं। लगभग 9.18 प्रतिशत कुएं 4-10 हेक्टेयर की भूमि वाले मध्यम किसानों के हैं और 2.96 प्रतिशत कुएं 10 हेक्टेयर से अधिक भूमि वाले किसानों के हैं।

भूजल निकासी संरचनाओं की संख्या पर विचार करते हुए 'कमांड एंड कंट्रोल' नीति के माध्यम से कृषि क्षेत्र में भूजल का विनियमन करना कठिन कार्य होगा। इसलिए सतत भूजल प्रबंधन के लिए भागीदारी दृष्टिकोण अधिक सार्थक होगा।

राज्यों/संघ राज्य क्षेत्रों को किसानों के लिए मुफ्त/रियायती विद्युत नीति की समीक्षा करने, उपयुक्त विद्युत मूल्य नीति तैयार करने और भूजल पर अत्यधिक निर्भरता को कम करने के लिए फसलों की अदला-बदली/विविधीकरण/अन्य पहलों के प्रति कार्य करने की सलाह दी जाती है।

कृषि क्षेत्र को भूजल निकासी के लिए एनओसी प्राप्त करने से छूट दी जाएगी।

### 4.0 वाणिज्यिक प्रयोग

नीति दिशा-निर्देशों के अनुरूप के अतिरिक्त अतिदोहित मूल्यांकन क्षेत्रों में किसी भी नये वृहद उद्योग को एनओसी नहीं दिया जाएगा।

वाणिज्यिक प्रयोग के लिए एनओसी देने हेतु आवेदन पर विचार करते समय भूजल संसाधनों की उपलब्धता पर पर्याप्त ध्यान दिया जाएगा।

भूजल निकालने वाले वाणिज्यिक उद्यमों को संदर्भित धाराओं में उल्लिखित जल प्रयोग के लेखा सहित वार्षिक जल लेखा परीक्षा रिपोर्ट ऑनलाइन प्रस्तुत करनी होगी। सीजीडब्ल्यूए/राज्य भूजल प्राधिकरण (एसजीडब्ल्यूए) सभी ऐसी लेखा परीक्षा रिपोर्ट ऑनलाइन प्रकाशित करेगा।

सीजीडब्ल्यूए/एसजीडब्ल्यूए आवधिक रूप से एनओसी के अनुपालन की जांच करने के लिए स्वायत्त एजेंसियों को कार्य पर लगाएगा।

### 4.1 औद्योगिक प्रयोग

अतिदोहित मूल्यांकन इकाइयों में सूक्ष्म, लघु और मध्यम उद्यमों (एमएसएमई) की श्रेणी में आने वालों के अलावा किसी भी नए उद्योग को भूजल निकासी के लिए एनओसी नहीं दिया जाएगा। तथापि कार्यबल के लिए पेयजल/घरेलू प्रयोग, इन नए उद्योगों द्वारा ग्रीनबेल्ट उपयोग के लिए एनओसी की अनुमति होगी। अतिदोहित क्षेत्रों में नए सीलबंद जल उद्योगों को, चाहे वे एमएसएमई श्रेणी में आते हों, एनओसी नहीं दिया जाएगा।

उद्योगों द्वारा भूजल निकासी के लिए एनओसी दिया जाएगा बशर्ते कि निम्नलिखित शर्तें पूरी हों:-

- ऐसे मामलों में ही एनओसी प्रदान किया जाएगा, जहां स्थानीय सरकारी जलापूर्ति एजेंसियां जल की अपेक्षित मात्रा की आपूर्ति करने में सक्षम नहीं है।

- II. सभी उद्योगों को अद्यतन जल दक्ष प्रौद्योगिकी को अपनाना अपेक्षित होगा, ताकि भूजल संसाधन पर निर्भरता कम की जा सके।
- III. 100 घनमीटर/दिन से अधिक भूजल की निकासी वाले सभी उद्योगों को कंफेडरेशन ऑफ इंडियन इंडस्ट्रीज (सीआईआई)/फेडरेशन इंडियन चेम्बर ऑफ कॉमर्स एंड इंडस्ट्रीज (एफआईसीसीआई)/नेशनल प्रोडक्टिविटी काउंसिल (एनपीसी) को प्रमाणित लेखा परीक्षकों के माध्यम से वार्षिक जल लेखा परीक्षा करवाना और इसके पूरे होने के तीन माह के भीतर लेखा परीक्षा रिपोर्ट सीजीडब्ल्यूए को प्रस्तुत करना अपेक्षित होगा। ऐसे सभी उद्योगों को उपयुक्त साधनों के माध्यम से अगले तीन वर्षों तक अपने भूजल प्रयोग को कम से कम 20 प्रतिशत कम करना अपेक्षित होगा।
- IV. अपने क्षेत्र के भीतर पर्यवेक्षण कुएं, पीजोमीटर का निर्माण और धारा 15 में यथा उल्लिखित उपयुक्त जल स्तर मॉनीटरिंग तंत्र की संस्थापना करना 10 घनमीटर/दिन से अधिक की भूजल निकासी करने का प्रस्ताव करने वाले उद्योगों के लिए अनिवार्य होगा। जल स्तर की मॉनीटरिंग परियोजना प्रस्तावक द्वारा की जाएगी। बोरवेल/प्रोडक्शन वेल से कम से कम 15 मीटर की दूरी पर पीजोमीटर (अन्वेषण कुएं) का निर्माण किया जाएगा। पीजोमीटर में गहराई और चिह्नित जलभृत क्षेत्र पम्पिंग कुएं/कुओं के समान ही होंगे। पीजोमीटर के डिजाइन और निर्माण के विस्तृत दिशा-निर्देश अनुलग्नक-II में दिए गए हैं। मासिक जल स्तर आंकड़े वेब पोर्टल के माध्यम से सीजीडब्ल्यूए को प्रस्तुत किए जाएंगे।
- V. प्रस्तावक को परियोजना क्षेत्र में छतका वर्षाजल संचयन/पुनर्भरण करना अपेक्षित है। भूजल को प्रदूषित करने की संभावना वाले उद्योगों (रसायन, फार्मास्यूटिकल, ड्राई, पिगमेंट, पेंट, वस्त्र, टैनिंग, पेस्टिसाइड/कीटनाशक, उर्वरक, स्लॉटर हाउस, विस्फोटक इत्यादि) को उद्योग में प्रयोग करने के लिए सतह संग्रह टैंकों में वर्षाजल संचय करना होगा।
- VI. जलभृत सिस्टम में शोधित/गैर शोधित अपशिष्ट जल डालने की सख्त मनाही है।
- VII. भूजल प्रदूषण के सम्भावित कारक उद्योगों जैसे टैनिंग, स्लॉटर हाउस, ड्राई, रसायन/पेट्रोकेमिकल, कोयला वॉशरीज, अन्य खतरनाक इकाइयों आदि को (सी पी सी बी लिस्ट के अनुसार) भूजल प्रदूषण के निवारणको सुनिश्चित करने के लिये आवश्यक वेल हेड संरक्षण उपायों को करने की आवश्यकता है (अनुलग्नक-III)।
- VIII. सुरक्षित, अर्ध गंभीर और गंभीर आकलन यूनिटों में भूजल की निकासी करने वाले सभी उद्योगों को तालिका 5.2 क और 5.3 क के अनुसार लागू भूजल निकासी प्रभार का भुगतान करना अपेक्षित होगा।
- IX. अतिदोहित आकलन यूनिटों में भूजल निकासी करने वाले सभी मौजूदा उद्योगों को तालिका 5.2 ख और 5.3 ख के अनुसार लागू भूजल निकासी प्रभारों का भुगतान करना होगा।

#### आवेदन के साथ प्रस्तुत किए जाने वाले दस्तावेज

- (क) ऐसे मामलों में, जहां भूजल 10 घनमीटर/दिन तक अपेक्षित है, स्थानीय सरकारी एजेंसियों से जलापूर्ति उपलब्ध न होने के संबंध में 10/- रु. के गैर न्यायिक स्टैप पेपर पर एक हलफनामा।
- (ख) ऐसे मामलों में, जहां भूजल 10 घनमीटर/दिन से अधिक अपेक्षित है, स्थानीय सरकारी जलापूर्ति एजेंसियों से ताजे जल/शोधित अपशिष्ट जल की आपूर्ति की उपलब्धता न होने/आंशिक रूप से होने का प्रमाणपत्र।
- (ग) किसी भी एनएबएल प्रत्यायित प्रयोगशाला अथवा सरकार से अनुमोदन प्राप्त प्रयोगशाला (एनओसी के लिए आवेदन कर रही मौजूदा परियोजनाओं के मामले में) से मौजूदा बोरवेल/ट्यूबवेल/डगवेल के भूजल गुणवत्ता आंकड़े।
- (घ) एनएबीएल प्रत्यायित प्रयोगशाला/सरकार से अनुमोदन प्राप्त प्रयोगशालाओं से मौजूदा उद्योगों के संबंध में बोरवेल/ट्यूबवेल/डगवेल के जल गुणवत्ता आंकड़े।
- (ङ) आवासन और शहरी कार्य मंत्रालय द्वारा जारी मॉडल भवन उप-विधियों के अनुसार क्षेत्र के भीतर वर्षा जल संचयन/पुनर्भरण के लिए प्रस्ताव।

- (च) **प्रभाव आकलन रिपोर्ट:** अतिदोहित, गंभीर और अर्ध गंभीर क्षेत्रों में 100 घनमीटर/दिन से अधिक भूजल निकालने वाली/प्रस्तावित सभी परियोजनाओं के लिए भूजल रिजीम पर मौजूदा/प्रस्तावित भूजल निकासी की प्रभाव आकलन रिपोर्ट और प्रत्यायित सलाहकारों द्वारा तैयार सामाजिक-आर्थिक प्रभाव रिपोर्ट भी प्रस्तुत करना अनिवार्य होगा। इस रिपोर्ट का प्रोफार्मा अनुलग्नक-IV में दिया गया है।

#### 4.2 खनन परियोजनाएं-

सभी मौजूदा और नई खनन परियोजनाओं को भूजल निकासी के लिए एनओसी प्राप्त करना अपेक्षित होगा। चूंकि खनन परियोजनाएं स्थान विशिष्ट होती हैं, इसलिए अतिदोहित आकलन यूनितों में ऐसी परियोजनाओं के लिए भूजल निकासी हेतु एनओसी देने पर कोई रोक नहीं होगी।

खनन परियोजनाओं के लिए एनओसी प्रदान किया जाएगा, बशर्ते कि निम्नलिखित विशिष्ट शर्तें पूरी हों:

- i) सभी खनन उद्योगों के लिए यह सुनिश्चित करना अनिवार्य होगा कि डी-वाटरिंग कार्यों से उपलब्ध जल उपयुक्त रूप से शोधित है और इसे सिंचाई, डस्ट सप्लेशन, खनन प्रक्रिया, अनुप्रवाह में पुनर्भरण और नदी सिस्टम में ई-फ्लो के रख-रखाव के लिए लाभप्रद रूप से उपयोग किया जाना चाहिए।
- ii) मासिक भूजल स्तर मॉनीटरिंग के लिए क्षेत्र में परिधि के साथ अन्वेषण कुएं (पीजोमीटर) का निर्माण, भूजल की 10 घनमीटर/दिन से अधिक की निकासी करने वाली/इसका प्रस्ताव करने वाली खानों के लिए अनिवार्य होगा। गहराई और पीजोमीटर में चिह्नित जलभृत क्षेत्र पम्पिंग कुएं/कुओं के अनुरूप होगा।
- iii) इसके अतिरिक्त, प्रस्तावक एनओसी में बताए गए मुख्य और प्रतिरोधक क्षेत्रों में अन्वेषण कुओं (पीजोमीटर) की स्थापना करके भूजल स्तरों को मॉनीटरिंग करेगा।
- iv) कोयला और अन्य मूल धातु खनन के मामले में परियोजना प्रस्तावक सतही जल के संदूषण से बचाव के लिए उच्च स्तर की डिवाटरिंग प्रौद्योगिकी (डिवाटरिंग अवरोधक संरचनाओं की श्रृंखला का निर्माण करके) का प्रयोग करेगा।
- v) इसके अलावा सभी खनन यूनितें एनएबीएल प्रत्यायित/सरकार से अनुमोदन प्राप्त प्रयोगशालाओं के माध्यम से खान रिसाव और खानडिस्चार्जकी जल गुणवत्ता को भी मॉनीटर करेंगी और स्वयं अनुपालान के समय इसे प्रस्तुत किया जायेगा।
- vi) सुरक्षित, अर्ध गंभीर और गंभीर आकलन यूनितों में भूजल की निकासी करने वाली सभी खनन परियोजनाएं तालिका 5.4 क के अनुसार लागू भूजल निकासी प्रभारों का भुगतान करेंगी।
- vii) अतिदोहित आकलन यूनितों में भूजल की निकासी करने वाली सभी खनन परियोजनाओं को तालिका 5.4 ख के अनुसार भूजल संग्रहण प्रभार का भुगतान करना होगा।

#### आवेदन के साथ प्रस्तुत किए जाने वाले दस्तावेज

- (क) संबंधित सरकारी एजेंसी/विभाग द्वारा अनुमोदित खनन योजना।
- (ख) आवासन और शहरी कार्य मंत्रालय द्वारा जारी मॉडल भवन उप नियमों के अनुसार क्षेत्र के भीतर वर्षा जल संचयन/पुनर्भरण के लिए प्रस्ताव।
- (ग) खनन के मूल और प्रतिरोधक क्षेत्रों दोनों में भूजल स्थिति का गहराई वार और वर्षवार खनन रिसाव गणना, खनन और डिवाटरिंग का भूजल क्षेत्र में आकलन प्रभाव और इसका सामाजिक-आर्थिक प्रभाव, पुनर्चक्रण, पुनः प्रयोग और पुनर्भरण का ब्यौरा, स्थानीय परिस्थितियों के आधार पर भूजल पर प्रतिकूल प्रभाव को न्यूनतम और समाप्त करने के लिए खनन और जल प्रबंधन के लिए प्रौद्योगिकी का प्रयोग करके पम्पिंग को कम करने के संबन्ध में प्रत्यायित सलाहकार द्वारा तैयार की गई व्यापक रिपोर्ट। रिपोर्ट का फॉर्मेट अनुलग्नक V में दिया गया है।

#### 4.3 आधारभूत परियोजनाएं

चूंकि आधारभूत परियोजनाएं स्थान विशिष्ट होती हैं, अतिदोहित आकलन यूनितों में स्थित ऐसी परियोजनाओं को एनओसी देने पर कोई रोक नहीं होगी। नई आधारभूत परियोजनाओं/आवासीय भवनों को निर्माण कार्यकलाप के दौरान डिवाटरिंग और / अथवा निर्माण के लिए भूजल का उपयोग अपेक्षित होगा। दोनों ही मामलों में आवेदक कार्य आरम्भ होने से पहले

सीजीडब्ल्यूए से एनओसी प्राप्त करेगा। तथापि अतिदोहित आकलन यूनिटों में निर्माण कार्यकलापों के लिए भूजल का प्रयोग तभी अनुमत्य होगा। यदि उस स्थान के 10 किलोमीटर की परिधि के भीतर कोई भी शोधित सीवेज जल उपलब्ध न हो। नई और मौजूदा आधारभूत परियोजनाओं को भूजल निकासी के लिए एनओसी प्राप्त करना भी अपेक्षित होगा।

अतिदोहित आकलन यूनिटों में वाटर पार्क, थीम पार्क, और मनोरंजन पार्कों के लिए भूजल की निकासी हेतु एनओसी नहीं दिया जाएगा।

आधारभूत परियोजनाओं की सांकेतिक सूची अनुलग्नक VI में दी गई है।

भूजल की निकासी के लिए एनओसी दिया जाएगा बशर्ते कि निम्नलिखित विशिष्ट शर्तें पूरी हों:

- i) आधारभूत परियोजनाएं, जिनके लिए डिवाटरिंग अपेक्षित हैं, के मामले में प्रस्तावक को डिवाटरिंग बहिर्भाव दर (डिजीटल वाटर फ्लो मीटर का प्रयोग करके) की नियमित मॉनीटरिंग करनी और सीजीडब्ल्यूए/एसजीडब्ल्यूए जो भी लागू हो, के वेब पोर्टल के माध्यम से आंकड़े प्रस्तुत करना आवश्यक होगा। मॉनीटरिंग रिकॉर्डों और परिणामों को सीजीडब्ल्यूए/एसजीडब्ल्यूए की अपेक्षानुसार निरीक्षण अथवा रिपोर्टिंग के लिए प्रस्तावक द्वारा दो वर्ष तक रखना अपेक्षित होगा।
- ii) ऐसी नई परियोजनाओं के लिए, जहां 20 घनमीटर/दिन से अधिक भूजल की आवश्यकता है, सीवेज परिशोधन संयंत्रों (एसटीपी) की संस्थापना अनिवार्य होगी। एसटीपी का जल शौचालय फ्लशिंग, कार धोने, बागवानी करने इत्यादि के लिए प्रयोग किया जाएगा।
- iii) आधारभूत डिवाटरिंग/निर्माण कार्यकलापों के लिए परियोजना प्रस्तावक द्वारा प्रस्तुत विस्तृत प्रस्ताव के अनुसार विशिष्ट अवधि के लिए एनओसी वैध होगा।
- iv) सुरक्षित, अर्ध गंभीर और गंभीर आकलन यूनिटों में भूजल निकासी की सभी आधारभूत परियोजनाओं को तालिका 5.3 क के अनुसार लागू भूजल निकासी प्रभार देना अपेक्षित होगा।
- v) अति-दोहित आकलन यूनिटों में भूजल निकालने वाली सभी आधारभूत परियोजनाओं (नई/मौजूदा) को तालिका 5.3 ख के अनुसार भूजल संग्रहण प्रभार का भुगतान करना होगा।

**आवेदन के साथ प्रस्तुत किए जाने वाले दस्तावेज**

- (क) ऐसे मामले, जहां डिवाटरिंग होती है, में पम्पिंग की विस्तृत योजना बताते हुए क्षेत्र में भूजल की स्थिति, पंप किए गए जल का प्रस्तावित प्रयोग और उसका भूजल रिजिम पर व्यापक प्रभाव आकलन के सम्बंध में प्रत्यायित सलाहकार द्वारा तैयार की गई प्रभाव आकलन रिपोर्ट प्रस्तुत करना अनिवार्य होगा। रिपोर्ट में भूजल स्तर की गिरावट, भूमि धंसान इत्यादि जैसे किन्हीं विशिष्ट पर्यावरणीय मुद्दों से जूझने के लिए पर्यावरणीय जोखिम और प्रस्तावित प्रबंधन नीतियों को दर्शाया जाना चाहिए।
- (ख) सुरक्षित और अर्ध गंभीर क्षेत्रों में निर्माण के लिए जल की अपेक्षा होने की स्थिति में किसी अन्य स्रोत से जल उपलब्ध न होने के संबंध में 10/-रु. के गैर-न्यायिक स्टैप पेपर पर एक हलफनामा।
- (ग) गंभीर और अतिदोहित क्षेत्रों में स्थल की 10 कि.मी. की परिधि के भीतर निर्माण के लिए परिशोधित सीवेज जल के उपलब्ध न होने के संबंध में सरकारी एजेंसी से प्रमाणपत्र।
- (घ) वाणिज्यिक प्रयोग के लिए आकलन यूनिटों की सभी श्रेणियों के संबंध में स्थानीय सरकारी जलापूर्ति एजेंसी से जल के उपलब्ध न होने के संबंध में प्रमाण पत्र।
- (ङ) आवासन और शहरी कार्य मंत्रालय द्वारा जारी मॉडल भवन उप-नियमों के अनुसार क्षेत्र के भीतर वर्षाजल संचयन/पुनर्भरण के लिए प्रस्ताव।
- (च) फ्लशिंग इत्यादि के लिए परिचक्रण/परिशोधित जल के पुनः उपयोग (वाणिज्यिक प्रयोग के लिए पूरी हो चुकी आधारभूत परियोजनाओं के मामले में) को ध्यान में रखते हुए राष्ट्रीय भवन कोड, 2016 (अनुलग्नक-1) के अनुसार संगणित जल आवश्यकता का ब्यौरा।
- (छ) वाणिज्यिक प्रयोग के लिए जल की आवश्यकता वाली आधारभूत परियोजनाओं के लिए संबंधित एजेंसी से पूरा होने का प्रमाणपत्र।

## 5.0 भूजल निकासी/संग्रहित प्रभार

शहरी क्षेत्रों में सभी रेजीडेंशियल अपार्टमेंट/ग्रुप हाउसिंग सोसाइटी/सरकारी जलापूर्ति एजेंसियों को भूजल निकासी के लिए भुगतान करना अपेक्षित होगा।

सुरक्षित, अर्ध गंभीर और गंभीर आकलन यूनिटों में भूजल की निकासी करने वाले सभी उद्योगों/खनन/आधारभूत परियोजनाओं को भूजल निकासी की मात्रा और इस दिशा-निर्देश में दिए गए व्यौरों के अनुसार आकलन यूनिट की श्रेणी के आधार पर भूजल निकासी प्रभार का भुगतान करना होगा।

अतिदोहित आकलन यूनिटों में भूजल की निकासी करने वाले एमएसएमई सहित सभी मौजूदा खनन/आधारभूत परियोजनाओं और मौजूदा उद्योगों को भूजल निकासी की मात्रा के आधार पर भूजल संग्रहण प्रभार देने होंगे। इसके अतिरिक्त, अतिदोहित क्षेत्रों में नए एमएसएमई, नई अवसंरचना और नई खनन परियोजनाओं को भी भूजल संग्रहण प्रभार का भुगतान करना अपेक्षित होगा।

एनओसी देते समय अथवा उसके नवीकरण के समय मौजूद भूजल दिशा-निर्देशों में निर्धारित शर्तों के अनुकरण में जिन मौजूदा उद्योगों, आधारभूत यूनिटों और खनन परियोजनाओं ने कृत्रिम पुनर्भरण संरचनाएं संस्थापित/निर्मित की हैं, को भूजल निकासी प्रभार/ भूजल संग्रहण प्रभार में 50 प्रतिशत की छूट मिलेगी, बशर्ते कि उनका कार्य निष्पादन और जांच संतोषजनक हो।

प्रस्तावित जल निकासी/संग्रहण प्रभार से सृजित राजस्व स्थल विशिष्ट उपयुक्त मांग/आपूर्ति पक्ष के कार्यों के कार्यान्वयन हेतु अलग निधि में रखा जाएगा।

## 5.1 भूजल निकासी/संग्रहण प्रभार की दरें

### I. शहरी क्षेत्रों में रेजीडेंशियल अपार्टमेंट/ग्रुप हाउसिंग सोसाइटी/सरकार जलापूर्ति एजेंसियों के लिए पेय और घरेलू प्रयोग।

केवल पेय/घरेलू प्रयोग के लिए जल की आवश्यकता वाले सभी रेजीडेंशियल अपार्टमेंट/ग्रुप हाउसिंग सोसाइटी को एनओसी लेने के लिए तालिका 5.1 में दी गई दरों के अनुसार भूजल निकासी प्रभार देना होगा।

तालिका 5.1 में पेय और घरेलू प्रयोग के लिए भूजल निकासी प्रभार

निकाले गए भूजलकी मात्रा (घनमीटर/माह)	भूजल निकासी प्रभार की दर (रु. प्रति घनमीटर)
0-25	कोई प्रभार नहीं
26-50	1.00
>50	2.00

सरकारी जलापूर्ति एजेंसियों और सरकारी आधारभूत परियोजनाओं को 0.50 रु. प्रति घनमीटर की दर से भूजल निकासी प्रभार का भुगतान करना होगा।

### II. सीलबंद पेयजल यूनिटें

सुरक्षित, अर्ध गंभीर और गंभीर आकलन यूनिटों में सीलबंद पेयजल यूनिटों के लिए भूजल निकासी प्रभारों की दर तालिका 5.2 क में दी गई है और अति दोहित आकलन यूनिटों में भूजल संग्रहण प्रभार तालिका 5.2 ख दिए गए हैं।

तालिका 5.2 क: सीलबंद पेयजल यूनितों के लिए भूजल निकासी प्रभार की दरें (रु. प्रति घनमीटर)

क्र.सं.	क्षेत्र की श्रेणी ↓ भूमिजल प्रयोग →	निकाले गए भूजल की मात्रा				
		50 घनमीटर/ दिन तक	51से<200 घनमीटर/दिन	200 से<1000 घनमीटर/दिन	1000 से <5000 घनमीटर/दिन	5000 घनमीटर/ दिन और अधिक
1.	सुरक्षित	1.00	3.00	5.00	8.00	10.00
2.	अर्ध-गंभीर	2.00	5.00	10.00	15.00	20.00
3.	गंभीर	4.00	10.00	20.00	40.00	60.00

तालिका 5.2 ख सीलबंद पेयजल यूनितों के लिए भूजल रेस्टोरेशन प्रभार की दरें (रु. प्रति घनमीटर)

क्र.सं.	क्षेत्र की श्रेणी ↓ भूमिजल → प्रयोग	निकाले गए भूजल की मात्रा				
		50 घनमीटर/ दिन तक	51 से<200 घनमीटर/ दिन	200 से<1000 घनमीटर/दिन	1000 से <5000 घनमीटर/दिन	5000 घनमीटर/ दिन और उससे अधिक
1.	अतिदोहित (केवल मौजूदा उद्योग)	8.00	20.00	40.00	80.00	120.00

## III. अन्य उद्योग और आधारभूत परियोजनाएं

सुरक्षित, अर्ध-गंभीर और गंभीर आकलन यूनितों में अन्य उद्योगों और आधारभूत परियोजनाओं के लिए भूमिजल निकासी प्रभार की दरें तालिका 5.3 क में दी गई हैं और अतिदोहित आकलन यूनितों में भूजल संग्रहण प्रभार तालिका 5.3 ख में दिए गए हैं।

तालिका 5.3 क: अन्य उद्योगों और आधारभूत परियोजनाओं के लिए भूजल निकासी प्रभार की दरें (रु. प्रति घनमीटर)

क्र.सं.	क्षेत्र की श्रेणी ↓ भूमिजल → प्रयोग	निकाले गए भूजल की मात्रा			
		< 200 घनमीटर/ दिन	200 से<1000 घनमीटर/दिन	1000 से <5000 घनमीटर/ दिन	5000 घनमीटर/दिन और उससे अधिक
1.	सुरक्षित	1.00	2.00	3.00	5.00
2.	अर्ध-गंभीर	2.00	3.00	5.00	8.00
3.	गंभीर	4.00	6.00	8.00	10.00

तालिका 5.3 ख: अन्य उद्योगों और आधारभूत परियोजनाओं के लिए भूजल निकासी प्रभार की दरें (रु. प्रति घनमीटर)

क्र.सं.	क्षेत्र की श्रेणी ↓ भूमिजल प्रयोग →	निकाले गए भूजल की मात्रा			
		< 200 घनमीटर/ दिन	200 से<1000 घनमीटर/दिन	1000 से <5000 घनमीटर/ दिन	5000 घनमीटर/दिनऔर उससे अधिक
1.	अतिदोहित (वर्तमान दिशा-निर्देशों के अनुसार मौजूद उद्योग/नए उद्योग)	6.00	10.00	16.00	20.00

## IV. खनन परियोजनाएं

सुरक्षित, अर्ध-गंभीर और गंभीर आकलन यूनिटों में भूजल निकालने वाले खनन के लिए भूजल निकासी प्रभार की दरें तालिका 5.4 क में दी गई हैं और अतिदोहित आकलन यूनिटों में भूजल निकालने वाली परियोजनाओं के मामले में भूजल संग्रहण प्रभार तालिका 5.4 ख में दिया गया है।

तालिका 5.4 क: खनन के लिए भूजल निकासी प्रभार की दरें (रु. प्रति घनमीटर)

क्र.सं.	क्षेत्र की श्रेणी ↓ भूमिजल प्रयोग →	निकाले गए भूजल की मात्रा			
		< 200 घनमीटर/ दिन	200 से<1000 घनमीटर/दिन	1000 से <5000 घनमीटर/ दिन	5000 घनमीटर/दिन और उससे अधिक
1.	सुरक्षित	1.00	2.00	2.50	3.00
2.	अर्ध-गंभीर	2.00	2.50	3.00	4.00
3.	गंभीर	3.00	4.00	5.00	6.00

तालिका 5.4 ख खनन के लिए भूजल निकासी प्रभार की दरें (रु. प्रति घनमीटर)

क्र.सं.	क्षेत्र की श्रेणी ↓ भूमिजल प्रयोग →	निकाले गए भूजल की मात्रा			
		< 200 घनमीटर/ दिन	200से<1000 घनमीटर/दिन	1000 से <5000 घनमीटर/ दिन	5000 घनमीटर/दिन और उससे अधिक
1.	अति-दोहित	4.00	5.00	6.00	7.00

## 6.0 प्रचुर जलापूर्ति

भूजल निकालने और उसकी आपूर्ति करने वाले सभी निजी टैंकर, जो प्रचुर जलापूर्ति करते हैं, को भूजल निकासी के लिए एनओसी प्राप्त करना अब जरूरी होगा। सुरक्षित, अर्ध-गंभीर और गंभीर आकलन इकाइयों में भूजल निकालकर टैंकरों के

माध्यम से प्रचुर जलापूर्ति करने वाले आपूर्तिकर्ता को तालिका 6.1 के अनुसार भूजल निकासी प्रभार का भुगतान करना होगा। अति-दोहित आकलन इकाइयों में भूजल निकालने वाले प्रचुर मात्रा में जलापूर्तिकर्ताओं को तालिका 6.1 ख के अनुसार भूजल संग्रहण प्रभार का भुगतान करना होगा। सभी टैंकरों में उनकी मूवमेंट/कार्य क्षेत्र की मॉनिटरिंग के लिए जीपीएस आधारित सिस्टम संस्थापित करना होगा।

प्रचुर/टैंकर जलापूर्ति के लिए एनओसी जारी करने की कार्य प्रणाली राज्यों/संघ राज्य क्षेत्रों के साथ परामर्श करके तैयार की जायेगी और इस संबंध में उपयुक्त दिशा-निर्देश तैयार किए जाएंगे और उनके लिए अलग से जारी किए जाएंगे।

**तालिका 6.1 क प्रचुर/ टैंकर जलापूर्ति के लिए भूजल निकासी प्रभार**

श्रेणी	प्रति घनमीटर की दर (रु. में)
सुरक्षित	10
अर्ध-गंभीर	20
गंभीर	25

**तालिका 6.1 ख प्रचुर/ टैंकर जलापूर्ति के लिए भूजल निकासी प्रभार**

श्रेणी	प्रति घनमीटर की दर (रु. में)
अतिदोहित	35

## 7.0 लवणीय भूजल की निकासी

अति-दोहित क्षेत्रों में स्थित आधारभूत / खनन परियोजनाओं द्वारा उद्योगों/डिवाटरिंग द्वारा प्रयोग के लिए ताजे जल की अपेक्षा सभी गहराइयों पर लवणीय भूजल अथवा अन्यथा लवणीय ताजे जल क्षेत्र में लवणीय भूजल की पॉकेटों से युक्त क्षेत्रों में लवणीय भूजल की निकासी को प्रोत्साहित किया जाएगा। ऐसे उद्योगों को भूजल निकासी प्रभार का भुगतान करने से छूट दी जाएगी।

डायनामिक भूजल संसाधन के अद्यतन मूल्यांकन के अनुसार सभी गहराइयों पर लवणीय भूजल वाली ऐसी आकलन इकाइयों की सूची सीजीडब्ल्यूए द्वारा उनकी वेबसाइट पर उपलब्ध कराई जाएगी। तथापि, यूनितों द्वारा बहिस्राव के निपटान के संबंध में पर्याप्त ध्यान दिया जाएगा ताकि जल निकायों और जलभृतों को प्रदूषण से बचाया जा सके।

इस संबंध में विस्तृत दिशा-निर्देश तैयार कर लिए गए हैं और अलग से जारी कर दिए गए हैं।

## 8.0 आद्र भूमि क्षेत्रों का संरक्षण

देश में आद्र भूमि क्षेत्र बहुत महत्वपूर्ण होते हैं क्योंकि वे ही ऐसे क्षेत्रों में भूजल की उपस्थिति का प्रत्यक्ष प्रतिबिंब होते हैं। आद्र भूमि प्राधिकरणों द्वारा आद्र भूमि क्षेत्रों की सुरक्षा का रखरखाव अलग से किया जा रहा है। चूंकि आद्र भूमि क्षेत्र के अस्तित्व के लिए भूजल बहुत महत्वपूर्ण होता है इसलिए आद्र भूमि क्षेत्र में किसी भी भूजल विकास की गतिविधि से उस क्षेत्र में जल की मात्रा प्रभावित होती है।

आद्र भूमि क्षेत्रों की 500 मीटर परिधि की सीमा के भीतर आने वाली परियोजनाओं को अनिवार्य रूप से एक विस्तृत प्रस्ताव प्रस्तुत करना होगा जिसमें यह दर्शाना होगा कि परियोजना प्रस्तावक द्वारा निकाले जाने वाले भूजल का संरक्षित आद्र भूमि क्षेत्रों पर प्रभाव नहीं पड़ेगा। इसके अलावा, सीजीडब्ल्यूए से अनुमति लेने से पहले, परियोजना क्षेत्र में अपनी परियोजनाओं को स्थापित करने के लिए उपयुक्त आद्र भूमि प्राधिकरणों से सहमति/अनुमोदन लेना होगा।

## 9.0 अनापत्ति प्रमाणपत्र में सामान्य अनुपालन की शर्तें

- एनओसी प्राप्त करने वाले सभी उपयोगकर्ताओं को डिजिटल वॉटर फ्लो मीटर (बीआईएस/आईएस मानकों के अनुरूप) को स्थापित करना और एक्सट्रैक्शन संरचना (ओं) में टेलीमेट्री सिस्टम लगाना अनिवार्य होगा और एनओसी देने के 30 दिनों के भीतर वेब-पोर्टल के माध्यम से सीजीडब्ल्यूए को इसकी स्थापना के बारे में सूचित किया जाएगा।

- ii. प्रस्तावकों द्वारा जल प्रवाह मीटर की अधिकृत एजेंसी से अनिवार्य रूप से एक वर्ष में एक बार जांच कराई जाएगी।
- iii. प्रस्तावक परियोजना क्षेत्र में छत पर वर्षा जल संचयन और पुनर्भरण प्रणाली स्थापित करेंगे।
- iv. प्रस्तावक धारा 6 में दी गई दरों के अनुसार भूजल निष्कर्षण की मात्रा के आधार पर भूजल निकालने/पुनर्भरण शुल्क का भुगतान करेंगे।
- v. भूजल स्तर निगरानी के उद्देश्य से निर्मित अवलोकन कुओं (पाईजोमीटर) का निर्माण धारा 15 के अनुसार अनिवार्य होगा। जल स्तर का डाटा सीजीडब्ल्यूए को वेब पोर्टल के माध्यम से उपलब्ध कराया जाएगा। पाईजोमीटर के निर्माण के लिए विस्तृत दिशानिर्देश अनुबंध- II में दिए गए हैं।
- vi. प्रस्तावकों को वर्ष में एक बार निष्कर्षण संरचना (ओं) से भूजल की गुणवत्ता की निगरानी करनी होगी। बोरवेल/नलकूपों/खोदे गए कुओं से जल के नमूने को हर साल अप्रैल/मई के दौरान एकत्र किया जाएगा और बुनियादी मानकों (धनायन और आयन), भारी धातुओं, कीटनाशकों/ जैविक यौगिकों इत्यादि का एनएबीएल अधिकृत प्रयोगशालाओं में विश्लेषण किया जाएगा। जल की गुणवत्ता के आंकड़ों को वेब पोर्टल के माध्यम से सीजीडब्ल्यूए को उपलब्ध कराया जाएगा।
- vii. यदि एनओसी की वैधता अवधि के भीतर यांत्रिक विफलता के कारण मौजूदा कुंआ अस्तित्व में नहीं रह जाता है, तो उपयोगकर्ता वेब पोर्टल पर सीजीडब्ल्यूए को सूचना देकर इसी तरह का दूसरे कुंआ का निर्माण कर सकता है। अप्रचलित कुंआ ठीक से सील किया जाएगा (अनुबंध VII का संदर्भ लें)। उपयोगकर्ता को इस संबंध में दस्तावेजी प्रमाण प्रस्तुत करना आवश्यक होगा। यदि मौजूदा निष्कर्षण संरचनाएं जल प्रदान करने में विफल रहती हैं और प्रस्तावक उसी परिसर में एक और ट्यूबवेल ड्रिल करने की इच्छा रखता है तो प्राधिकरण की पूर्व अनुमति लेना अपेक्षित होगा। यदि प्रतिस्थापन कुंआ को दूसरी अलग जगह पर ड्रिल किया जाना है तो प्रस्तावक को नया एनओसी प्राप्त करना होगा।
- viii. जहां कहीं भी संभव हो, वहां रि-साईकिलड/अपशिष्ट जल शोधन से ग्रीनबेल्ट (बागवानी) में जल की आवश्यकता को पूरा किया जाएगा।
- ix. स्वामित्व परिवर्तन के मामले में, उद्योग के नए मालिक द्वारा परिसर पर कब्जा लेने के 60 दिनों के भीतर दस्तावेजी प्रमाण के साथ एनओसी में आवश्यक परिवर्तनों को शामिल करने के लिए आवेदन करना होगा।

### 10.0 एनओसी शर्तों के अनुपालन की निगरानी

एनओसी की शर्तों के अनुपालन की निगरानी के लिए केंद्रीय भूजल प्राधिकरण और राज्य/संघ शासित क्षेत्रों के भूजल प्राधिकरण निम्नलिखित कदम उठाएंगे:

- क. अनुपालन निगरानी के लिए उपयुक्त एमआईएस विकसित किया जाएगा।
- ख. जिला कलेक्टर/उपायुक्त (डीसी) / जिला मजिस्ट्रेट (डीएम) अनधिकृत भूजल निष्कर्षण संरचनाओं को सील करना, बिजली काटना, एनओसी की शर्तों का उल्लंघन करने वालों के खिलाफ अभियोजन शुरू करना और पर्यावरण क्षतिपूर्ति की कार्रवाई जैसे बाध्यकारी उपायों को करने के लिए अधिकृत हैं।
- ग. सक्षम प्राधिकारी के अनुमोदन से सीजीडब्ल्यूबी/ सीजीडब्ल्यूए और राज्य भूजल संगठनों के तकनीकी अधिकारियों को निगरानी और आवधिक निरीक्षण की कार्रवाई करने के लिए अधिकृत किया जाता है।
- घ. एनओसी शर्तों में किसी भी तरह के उल्लंघन के मामले में, प्रस्तावक धारा 16 के अनुसार दंड का भुगतान करने के लिए उत्तरदायी होंगे।

### 11.0 एनओसी का नवीनीकरण

एनओसी का समय-समय पर नवीनीकरण किया जाएगा, जिसमें निम्नलिखित शर्तों का अनुपालन किया जाएगा:

- i. आवेदक को इसकी वैधता की समाप्ति से कम से कम 90 दिन पहले एनओसी के नवीकरण के लिए आवेदन करना होगा।
- ii. एनओसी के नवीकरण का आवेदन अनुपालन रिपोर्ट के साथ होगा।

iii. नवीनीकरण प्रदान करने से पहले, केंद्रीय भूजल प्राधिकरण या राज्य / संघ राज्य क्षेत्र प्राधिकरण को स्वयं को संतुष्ट करेगा कि एनओसी की शर्तों का अनुपालन किया गया है।

iv. मूल्यांकन श्रेणी में परिवर्तन के मामले में, नई श्रेणी में निर्धारित शर्तों के साथ नवीकरण की अनुमति दी जाएगी।

v. निर्दिष्ट शर्तों के अनुसार विभिन्न उपयोगों के लिए एनओसी का नवीनीकरण निम्नानुसार किया जाएगा:

श्रेणी	उपयोग	नवीनीकरण की अवधि
गंभीर, अर्ध-गंभीर और सुरक्षित	पीने और घरेलू उपयोग एवं शहरी जल आपूर्ति एजेंसियों के लिए बुनियादी ढांचा परियोजनाएं	5 वर्ष
	इंडस्ट्रीज	3 वर्ष
	खान	2 वर्ष
अति दोहित	अति-दोहित क्षेत्रों में सभी उपयोगकर्ता	2 वर्ष

vi. यदि नवीनीकरण का आवेदन समय पर प्रस्तुत किया गया है और सीजीडब्ल्यूए / संबंधित राज्य / संघ राज्य क्षेत्र के प्राधिकरण, समय पर आवेदन की प्रक्रिया को आगे बढ़ाने में असमर्थ हैं तो एनओसी को एनओसी के नवीकरण की तारीख से बढ़ाया जाना माना जाएगा।

vii. यदि प्रस्तावक एनओसी की समाप्ति की तारीख से 3 महीने के भीतर नवीकरण के लिए आवेदन करने में विफल रहता है तो प्रस्तावक पर एनओसी की समाप्ति की तारीख से शुरू होने वाली अवधि और सक्षम प्राधिकारी द्वारा नवीनीकरण किए जाने की तारीख तक पर्यावरण क्षतिपूर्ति के भुगतान का उत्तरदायी होगा।

## 12.0 एनओसी का विस्तार

यदि प्रस्तावक वास्तविक कारणों से एनओसी की वैधता अवधि में कुएं (ओं) का निर्माण करने में असमर्थ रहता है तो प्रस्तावक को एनओसी के विस्तार के लिए आवेदन करना होगा। विस्तार के आवेदन में विलंब के कारणों को दस्तावेजों के आधार पर पुष्ट किया जाना चाहिए। एनओसी को विस्तार दिए जाने की अन्य शर्तें, नई एनओसी के समान ही होंगी।

एनओसी को अधिकतम दो वर्षों के लिए बढ़ाया जाएगा। इस बढ़ाई गई अवधि की समाप्ति के बाद इसमें कोई और विस्तार नहीं दिया जाएगा। ऐसी स्थिति में, आवेदक को एनओसी लेने के लिए नए सिरे से आवेदन करना होगा।

## 13.0 अवैध भूजल निकासी के खिलाफ शक्तियों का प्रत्यायोजन

केंद्रीय भूजल प्राधिकरण ने प्रत्येक राजस्व जिला/ सब डिविजनल के जिला मजिस्ट्रेटों/जिला कलेक्टरों/ सब डिविजनल मजिस्ट्रेटों को प्राधिकृत अधिकारी नियुक्त किया है, जिन्हें अवैध कुओं को सील करने, कुओं को मिलने वाली बिजली को काटने, उल्लंघन करने वालों के खिलाफ अभियोजन इत्यादि शुरू करने की शक्ति प्रदान की गई है, जिसमें उनके संबंधित अधिकारक्षेत्र में भूजल से संबंधित शिकायतों का निवारण शामिल है।

दिशा-निर्देशों के अनुसार निगरानी और अनुपालन तंत्र को और अधिक विकेंद्रीकृत और मजबूत बनाने के लिए, राज्यों/संघ राज्य क्षेत्रों के राजस्व और उद्योगों के संबंधित विभागों के अधिकारियों को राज्य/संघ राज्य क्षेत्रों की सरकारों के परामर्श से प्राधिकृत अधिकारी के रूप में नियुक्त किया जाएगा।

सीजीडब्ल्यूए द्वारा एनओसी एप्लीकेशन पोर्टल (एनओसीएपी) में जारी एनओसी की एक प्रति संबंधित जिला मजिस्ट्रेट/जिला कलेक्टर को भेजी जाएगी। केंद्रीय भूजल प्राधिकरण के निर्देशों के उल्लंघन और एनओसी में निर्धारित शर्तों को पूरा न करने की स्थिति में प्राधिकृत अधिकारी, पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 15 से 21 के तहत उचित याचिका/मूल आवेदन आदि उचित न्यायालयों में दायर करेंगे।

## 14.0 भूजल स्तर की निगरानी

भूजल स्तर की निगरानी के लिए सभी परियोजना प्रस्तावकों (10 सीयूएम/डी से अधिक भूजल निकासी) को अपने परिसर के भीतर अनिवार्य रूप से पाईजोमीटर (अवलोकन कुओं) का निर्माण करना पड़ता है। अनुपालन शर्तों की ऐसी व्यवस्था यह सुनिश्चित करने के लिए बनाई गई है जिससे कि हर महीने परियोजना क्षेत्र में भूजल स्तर की निगरानी और अवलोकन किया जा सके। इस संबंध में परियोजना प्रस्तावकों द्वारा पाईजोमीटर के माध्यम से जल स्तर की निगरानी के आवश्यक मानदंडों को तालिका 15.1 में दिया गया है।

निर्माण किए जाने वाले पीजोमीटर और जल स्तर निगरानी तंत्र के प्रकार की तालिका 15.1					
क्र.सं.	भूजल निकासी की मात्रा (सीयूएम/डी)	अपेक्षित पीजोमीटर की संख्या	निगरानी प्रणाली		
			मैनुअल	डीडब्ल्यूए लआर	डीडब्ल्यूएलआरके साथ टेलीमेटरी
1	<10	0	0	0	0
2	11-50	1	1	0	0
3	51-500	1	0	1	0
4	>500	2	0	1	1

पाईजोमीटर उपयुक्त ढंग से स्थापित किया जाएगा जिससे पाईजोमीटर में टैप किए गए जलभूत क्षेत्र की समानता पंपड कुएं के समान सुनिश्चित हो सके।

### 15.0 पर्यावरणीय क्षतिपूर्ति

उपयुक्त प्राधिकरण से वैध एनओसी लिए बिना उद्योगों, इंफ्रास्ट्रक्चर इकाइयों और खदान परियोजनाओं द्वारा व्यावसायिक उपयोग के लिए भूजल निष्कर्षण अवैध माना जाएगा और इस तरह के निकाय भूजल निकासी की मात्रा के लिए पर्यावरण क्षतिपूर्ति के भुगतान के लिए उत्तरदायी होंगे। नीचे उल्लिखित केंद्रीय प्रदूषण नियंत्रण बोर्ड (सीपीसीबी) द्वारा निर्धारित मानदंडों का उपयोग पर्यावरणीय क्षतिपूर्ति की गणना के लिए किया जाएगा:

ईसीजीडब्ल्यू = प्रतिदिन भूजल खपत x पर्यावरण क्षतिपूर्ति दर (ईसीआरजीडब्ल्यू) x दिन की संख्या x निवारण घटक

जहां भूजल खपत घन मीटर/ दिन और ईसीआरजीडब्ल्यू रु./ सीयूएम में है

### 15.1 पर्यावरणीय क्षतिपूर्ति की दरें:

मूल्यांकन इकाइयों की विभिन्न श्रेणियों में अलग-अलग उपयोगकर्ताओं की पर्यावरणीय क्षतिपूर्ति (ईसीआरजीडब्ल्यू) की दरें तालिका 15.1 से 15.3 में दी गई हैं।

तालिका 15.1 : पैकेज्ड पेयजल इकाइयों के लिए ईसीआरजीडब्ल्यू

क्र.सं.	क्षेत्र वर्गीकरण	जल की खपत (सीयूएम/दिन)			
		<200/	200 to <1000	1000 to <5000	5000 & above
		पर्यावरणीय क्षतिपूर्ति दर (ईसीआरजीडब्ल्यू) रु./घन मीमें .			
	सुरक्षित	12	18	24	30
2	अर्ध-गंभीर	24	36	48	60
3	गंभीर	36	48	66	90
4	अति-दोहित	48	72	96	120

टिप्पणी:-न्यूनतम ईसीजीडब्ल्यू 1,00,000/- रुपए से कम नहीं होगा।

तालिका 15.2: खनन/इंफ्रास्ट्रक्चर डि-वाटरिंग परियोजनाओं के लिए ईसीआरजीडब्ल्यू

क्र.सं.	क्षेत्र वर्गीकरण	जल खपत (सीयूएम/दिन)			
		<200	200 to <1000	1000 to <5000	5000 & above
		पर्यावरणीय क्षतिपूर्ति दर (ईसीआरजीडब्ल्यू) रु./घन मीमें .			
1	सुरक्षित	15	21	30	40
2	अर्ध-गंभीर	30	45	60	75
3	गंभीर	45	60	85	115
4	अति-दोहित	60	90	120	150

टिप्पणी:-न्यूनतम ईसीआरजीडब्ल्यू 1,00,000/- रुपए से कम नहीं होगा।

तालिका 15.3: औद्योगिक इकाइयों के लिए ईसीआरजीडब्ल्यू

क्र.सं.	क्षेत्र वर्गीकरण	जल की खपत (सीयूएम/दिन)			
		<200	200 to <1000	1000 to <5000	5000 & above
		पर्यावरणीय क्षतिपूर्ति दर (ईसीआरजीडब्ल्यू) रु./घन मीमें .			
1	सुरक्षित	20	30	40	50
2	अर्ध-गंभीर	40	60	80	100
3	गंभीर	60	80	110	150
4	अति-दोहित	80	120	160	200

टिप्पणी:-न्यूनतम ईसीआरजीडब्ल्यू 1,00,000/- रुपए से कम नहीं होगा।

### 15.2 नुकसान और पर्यावरणीय क्षति की भरपाई के लिए निवारक कारक (पैकेज्ड पेयजल यूनिट्स, खनन, उद्योग और इंफ्रास्ट्रक्चर से जुड़ी परियोजनाओं के लिए)

अवैध भूजल निष्कर्षण की अवधि के आधार पर निम्नलिखित निवारक कारकों को नुकसान और पर्यावरणीय क्षति की भरपाई का विवरण तालिका 15.4 में दिया गया है।

तालिका 15.4: भूजल निकासी की मात्रा और अवैध निकासी के वर्षों की संख्या के आधार पर निवारक कारक

क्र.सं.	जल की खपत	निवारक कारक		
		< 2 वर्ष	2-5 वर्ष	>5 वर्ष
1	<1000 केएलडी	1.00	1.00	1.25
2	1000-5000 केएलडी	1.00	1.00	1.50
3	>5000 केएलडी	1.00	1.25	2.00

टिप्पणी: केएलडी – किलोमीटर प्रतिदिन

### 16.0 दंड का प्रावधान

उपयुक्त प्राधिकारी द्वारा जारी एनओसी शर्तों का पालन न करने की स्थिति में प्रस्तावकों पर जुर्माना लगाया जाएगा। एनओसी की विभिन्न शर्तों का पालन नहीं करने की प्रस्तावित दंड की दरें तालिका 16.1 में दी गई हैं। जल शक्ति मंत्रालय में सक्षम प्राधिकारी के अनुमोदन से दंड की दरों की समय-समय पर समीक्षा की जाएगी।

## तालिका 16.1: एनओसी शर्तों का अनुपालन न करने पर दंड का प्रावधान

क्र.सं.	मदें	शुल्क रुपए में
1	टेलीमेट्री सिस्टम के साथ स्थापित नहीं होना/ दोषपूर्ण डिजिटल वॉटर फ्लो मीटर।	200000
2	अतिरिक्त भूजल निष्कर्षण संरचनाओं का अप्रकटीकरण/निर्माण क) गैर-कार्यात्मक संरचनाएं। ख) अप्रचलित/ परित्यक्त टिप्पणी: दी गई दरें गैर-कार्यात्मक/अप्रचलित/ परित्यक्त संरचनाओं के लिए हैं। समेकित दंड के लिए इस तरह की संरचनाओं की कुल संख्या के साथ इसे गुणा किया जाएगा।	200000 100000
3	ताजे जल क्षेत्रों की रिपोर्टिंग आवेदन में त्रैकिश/लवणता क्षेत्र के रूप में।	200000
4	पाईज़ोमीटर को स्थापित नहीं किया जाना।	200000
5	दोषपूर्ण डीडब्ल्यूएलआर / टेलीमेट्री प्रणाली / स्थापित नहीं होना	100000
6	पुनर्भरण की अपर्याप्त क्षमता / जल संरक्षण संरचनाओं का निर्माण नहीं होना।	500000
7	पुनर्भरण संरचनाओं का रखरखाव न होना।	200000
8	शोधित / बिना शोधित जल को जलभूत प्रणाली में पहुंचाना। नोट: जुमनि के अलावा, प्रस्तावक पर्यावरण (संरक्षण) अधिनियम, 1886 के प्रावधानों के अनुसार जलभूत सुधार लागत वहन करेगा।	1000000
9	जल स्तर / जल गुणवत्ता डाटा को प्रस्तुत नहीं करना।	50000
10	भूजल की दैनिक निकासी/निष्कर्षण आंकड़ों की लॉग बुक का रखरखाव नहीं करना।	50000
11	पुनर्भरण संरचना (ओं) की तस्वीर न प्रस्तुत करना।	50000
12	अपनी अनुपालन रिपोर्ट प्रस्तुत न करना।	100000
13	प्राधिकृत/अपंजीकृत ड्रिलिंग रिग्स (प्रति संरचनाओं) द्वारा भूजल निष्कर्षण संरचनाओं का निर्माण।	100000
14	जलापूर्ति टैंकरो के पंजीकरण न करना।	500000
15	गलत सूचना / वचन देना।	100000

मौजूदा जारी एनओसी पत्र में सुधार / संशोधन के लिए शुल्क का भुगतान भी करना होगा। ऐसे शुल्कों का विवरण तालिका 16.2 में दिया गया है।

## तालिका 16.2: जारी मौजूदा एनओसी में सुधार / संशोधन के लिए प्रस्तावित शुल्क

क्र.सं.	मदें	शुल्क रुपए में
1	पुनर्भरण मात्रा में बदलाव	10000
2	उपयोगकर्ता आईडी में परिवर्तन।	5000
3	फर्म के नाम में बदलाव	5000
4	एनओसी को बढ़ाया जाना	5000
5	एनओसी को प्रतिरूप में जारी करना	5000
6	एनओसी के शुद्धिपत्र को जारी करना	5000
7	कोई अन्य मद / सुधार आदि	5000

**17.0 अन्य महत्वपूर्ण शर्तें (सभी पर लागू):**

- i. केंद्रीय भूजल बोर्ड/ राज्य भूजल प्राधिकरण से जारी होने वाली वैध एनओसी के बिना किसी व्यक्ति/एजेंसी को भूजल की बिक्री करने की अनुमति नहीं है।
- ii. इंफ्रास्ट्रक्चर परियोजनाओं में भूजल समावेशन/भंडारण सुनिश्चित करने के लिए पक्के / पार्किंग क्षेत्र को इंटरलॉकिंग / छिद्रित टाइलों या अन्य उपयुक्त उपायों के साथ कवर किया जाना चाहिए।
- iii. इंफ्रास्ट्रक्चर परियोजनाओं के मामले में, फर्म/संस्था, परियोजनाओं में दोहरी जलापूर्ति प्रणाली के कार्यान्वयन को सुनिश्चित करेगी। इसका अनुपालन वेब पोर्टल के माध्यम से प्रस्तुत किया जाएगा।
- iv. एनओसी में उल्लिखित शर्तों का अनुपालन न करने पर प्रदान की गई एनओसी के रद्द होने / एनओसी के नवीकरण न होने का पर्याप्त कारण माना जा सकता है।
- v. संबंधित श्रेणियों में निर्दिष्ट पुख्ता दस्तावेजों के बिना किसी भी आवेदन पर विचार नहीं किया जाएगा।
- vi. निष्कर्षण संरचना (ओं) को परियोजना संपत्ति परिसर के अंदर स्थित होना चाहिए।
- vii. एनओसी में निर्धारित शर्तों का अनुपालन उपयोगकर्ताओं द्वारा सीजीडब्ल्यूए / राज्य भूजल प्राधिकरण के वेब पोर्टल में ऑनलाइन रिपोर्ट किया जाएगा।
- viii. निर्धारित प्रसंस्करण शुल्क, यदि कोई हो, समय-समय पर विभिन्न सेवाओं के लिए, लिया जाएगा।

**टिप्पणी:**

1. दिशानिर्देश समय-समय पर संशोधन के अधीन हैं।
2. इस दस्तावेज में अनुलग्नक सहित हिंदी और अंग्रेजी संस्करणों के बीच किसी भी विसंगति के मामले में, बाद वाला मान्य होगा।

**अनुलग्नक I****पेयजल और घरेलू उपयोग के लिए जल की आवश्यकताओं का अनुमान****(स्रोत: नेशनल बिल्डिंग कोड 2016, बीआईएस)**

क) आवासीय भवन:

आवास	आबादी
1 शयनकक्ष आवास इकाई	4
2 शयनकक्ष आवास इकाई	5
3 शयनकक्ष आवास इकाई	6
4 शयनकक्ष आवास इकाई और उससे अधिक	7

**टिप्पणियां:**

- 1) उपरोक्त आंकड़े सहयोगी कार्मिकों सहित घरेलू परिवारों पर विचार करते हैं, जहां कहीं भी लागू हो।
- 2) प्लॉट किए गए विकास में घरेलू परिवार इकाइयों की अपेक्षित संख्या और इनके प्रकार पर विचार करने के बाद आबादी का अनुमान लगाया जा सकता है।
- 3) ईडब्ल्यूएस श्रेणी के तहत आवासीय इकाई में अपेक्षित आबादी 4 होगी और स्टूडियो अपार्टमेंट में अपेक्षित आबादी 2 होगी।

एक सामान्य नियम के अनुसार घरेलू और गैर-घरेलू जरूरतों के लिए प्रति व्यक्ति प्रति दिन निम्नलिखित दरों पर विचार किया जा सकता है:

क) 20,000 तक की आबादी वाले समुदायों के लिए:

1)	स्टैंड पोस्ट के माध्यम से जलापूर्ति:	40 एलपीएचडी (न्यूनतम)
2)	घरेलू सेवा के माध्यम से जलापूर्ति: कनेक्शन	70 से 100 एलपीएचडी

ख) उन समुदायों के लिए: 100 से 135 एलपीएचडी

पूर्ण फ्लशिंग प्रणाली के साथ 20,000

से 100,000 की एक साथ आबादी

ग) उन आबादी वाले समुदायों के लिए: 150 से 200 एलपीएचडी

पूर्ण फ्लशिंग प्रणाली के साथ 100,000

से अधिक आबादी के लिए

**टिप्पणी** - मौजूदा परिस्थितियों और जल की उपलब्धता पर निर्भरता को ध्यान में रखते हुए मध्यम आय समूह (एमआईजी) और निम्न आय वर्ग (एलआईजी) और आर्थिक रूप से कमजोर वर्ग (ईडब्ल्यूएस) के लिए घरों में प्रति दिन 150 से 200 लीटर प्रति व्यक्ति के हिसाब से की जाने वाली जलापूर्ति को प्रति दिन 135 लीटर तक घटाया जा सकता है। 150 से 200 लीटर प्रति दिन प्रति व्यक्ति में से 45 लीटर प्रति व्यक्ति जल की मात्रा फ्लशिंग और दूसरे घरेलू उद्देश्यों में प्रयोग की जा सकती है।

**क. आवासीय इमारतों के अलावा अन्य भवनों में जल की आवश्यकता**

क्र. सं.	भवन का प्रकार	घरेलू लीटर प्रति व्यक्ति प्रतिदिन	फ्लशिंग लीटर प्रति व्यक्ति प्रतिदिन	कुल खपत लीटर प्रति व्यक्ति प्रतिदिन
1.	कैंटीन सहित कारखाने जहां स्नानगृह उपलब्ध कराना आवश्यक है	30	15	45
2.	कैंटीन सहित कारखाने जहां स्नानगृह उपलब्ध कराना आवश्यक नहीं है	20	10	30
3.	अस्पताल (कपड़े धोना और रसोई को छोड़कर):			
	क) बिस्तरों की संख्या 100 से अधिक नहीं	230	110	340
	ख) बिस्तरों की संख्या 100 से अधिक	300	150	450
	ग) बाह्य रोगी विभाग (ओपीडी)	10	5	15
4.	नर्सों के घर और मेडिकल क्वार्टर	90	45	135
5.	हॉस्टल	90	45	135
6.	होटल (3 सितारा तक) कपड़े धोना, रसोई, कर्मचारियों और जल निकायों को छोड़कर	120	60	180
7.	होटल (4 सितारा और इससे अधिक) कपड़े धोना, रसोई, कर्मचारियों और जल निकायों को छोड़कर	260	60	320
8.	कार्यालय (कैंटीन सहित)	25	20	45
9.	रसोई के लिए अपेक्षित जल सहित रेस्तरां और फूड कोर्ट:			
	क) रेस्तरां	55 प्रति सीट	15 प्रति सीट	70 प्रति सीट
	ख) फूड कोर्ट	25 प्रति सीट	10 प्रति सीट	35 प्रति सीट
10.	क्लब हाउस	25	20	45
11.	स्टेडियम	4	6	10
12.	सिनेमा, कॉन्सर्ट हॉल, थियेटर और मल्टीप्लेक्स	5 प्रति सीट	10 प्रति सीट	15 प्रति सीट
13.	13. स्कूल / शैक्षणिक संस्थान :			
	क) बिना बोर्डिंग सुविधाओं के	25	20	45
	ख) बोर्डिंग सुविधाओं सहित	90	45	135

14.	खरीदारी और खुदरा (मॉल)			
	क) कर्मचारी	25	20	45
	ख) आगंतुक	5	10	15
15.	ट्रैफिक टर्मिनल स्टेशन			
	क) हवाई अड्डे	40	30	70
	ख) स्नान की सुविधा सहित रेलवे स्टेशन (जंक्शन)	40	30	70
	ग) बिना स्नान की सुविधा वाले रेलवे स्टेशन (जंक्शन)	30	15	45
	घ) स्नान की सुविधा सहित रेलवे स्टेशन (इंटरमीडिएट)	25	20	45
	ड) बिना स्नान की सुविधा वाले रेलवे स्टेशन (इंटरमीडिएट)	15	10	25
	च) अंतरराज्यीय बस टर्मिनल	25	20	45
	छ) अंतरराज्यीय बस टर्मिनल/मेट्रो स्टेशन	10	5	15

**टिप्पणियां:**

1. आगंतुकों के लिए जल की मांग की गणना प्रति दिन प्रति व्यक्ति 15 लीटर की खपत हो सकती है।
2. जल की मांग में रोगियों, परिचारकों, आगंतुकों और कर्मचारियों की आवश्यकता शामिल है। रसोई, कपड़े धोना और क्लीनिकल जल की अतिरिक्त मांग की गणना वास्तविक आवश्यकताओं के आधार पर की जाएगी।
3. कर्मचारियों और विक्रेताओं द्वारा प्रयोग की जा रही सुविधाओं पर विचार करते हुए स्टेशनों द्वारा नियंत्रित किए जाने वाले यात्रियों की औसत संख्या के आधार पर लोगों की संख्या का निर्धारण किया जाएगा।
4. औसत सीजनल पीक आवश्यकताओं पर विचार किया जाना चाहिए।
5. अस्पतालों को श्रेणी क (25 से 50 बिस्तर), श्रेणी ख (51 से 100 बिस्तर), श्रेणी ग (101 से 300 बिस्तर), श्रेणी घ (301 से 500) और श्रेणी ड (501 से 750 बिस्तर) में वर्गीकृत किया जा सकता है।

**अनुलग्नक II****पाईजोमीटर के निर्माण और भूजल स्तर और गुणवत्ता की निगरानी के लिए दिशानिर्देश**

पाईजोमीटर एक बोरवेल/ट्यूबवेल है जिसका उपयोग केवल टेप को घटाकर/साउंडर या स्वचालित / डिजिटली जल स्तर मापने वाले उपकरण के तौर पर किया जाता है। जब भी जरूरत होती है तो जल की गुणवत्ता के परीक्षण के लिए जल नमूना लेने के लिए भी इसका उपयोग किया जाता है। पाईजोमीटर को स्थापित करने के सामान्य दिशानिर्देश निम्नानुसार हैं:

- पंपिंग कुएं से 50 मीटर की न्यूनतम दूरी पर पाईजोमीटर को स्थापित/निर्माण किया जाना होता है जहां से भूजल निकाला जा रहा है। पाईजोमीटर का व्यास लगभग चार इंच से छह इंच होना चाहिए।
- पाईजोमीटर की गहराई पंपिंग कुएं से समान होनी चाहिए, जहां से भूजल निकाला जा रहा है। अगर, एक से अधिक पंपिंग कुओं का निर्माण एक्विफर्स को अलग-अलग गहराई पर करने के लिए किया जाता है, तो एक से अधिक पाईजोमीटरों को अलग-अलग एक्विफर्स को टैप करने वाले कुओं की तरह बनाने की आवश्यकता होगी।
- आसपास के ट्यूबवेल से पंपिंग को लगभग चार से छह घंटे के लिए रोक जाने के बाद ही पाईजोमीटर में जल स्तर की माप ली जानी चाहिए।

- उद्योगों और खनन द्वारा जल की निकासी के लिए प्री-मानसून (अप्रैल / मई) की अवधि के दौरान वर्ष में एक बार भूजल गुणवत्ता की निगरानी की जानी चाहिए। एनएबीएल मान्यता प्राप्त प्रयोगशाला से भूजल के नमूनों का विश्लेषण किया जाना चाहिए।
- मानदंडों और पहचान के लिए पाईज़ोमीटर / ट्यूबवेल की संख्या, गहराई और पाईज़ोमीटर / ट्यूबवेल ज़ोन टैप की जानकारी उपलब्ध कराने के लिए पाईज़ोमीटर / ट्यूबवेल साइट पर एक स्थायी डिस्प्ले बोर्ड स्थापित किया जाना चाहिए।
- मापन के लिए सुरक्षा और पहुंच के संबंध में किसी अन्य साइट की विशिष्ट आवश्यकताओं का ध्यान रखा जा सकता है।

### **अनुलग्नक III**

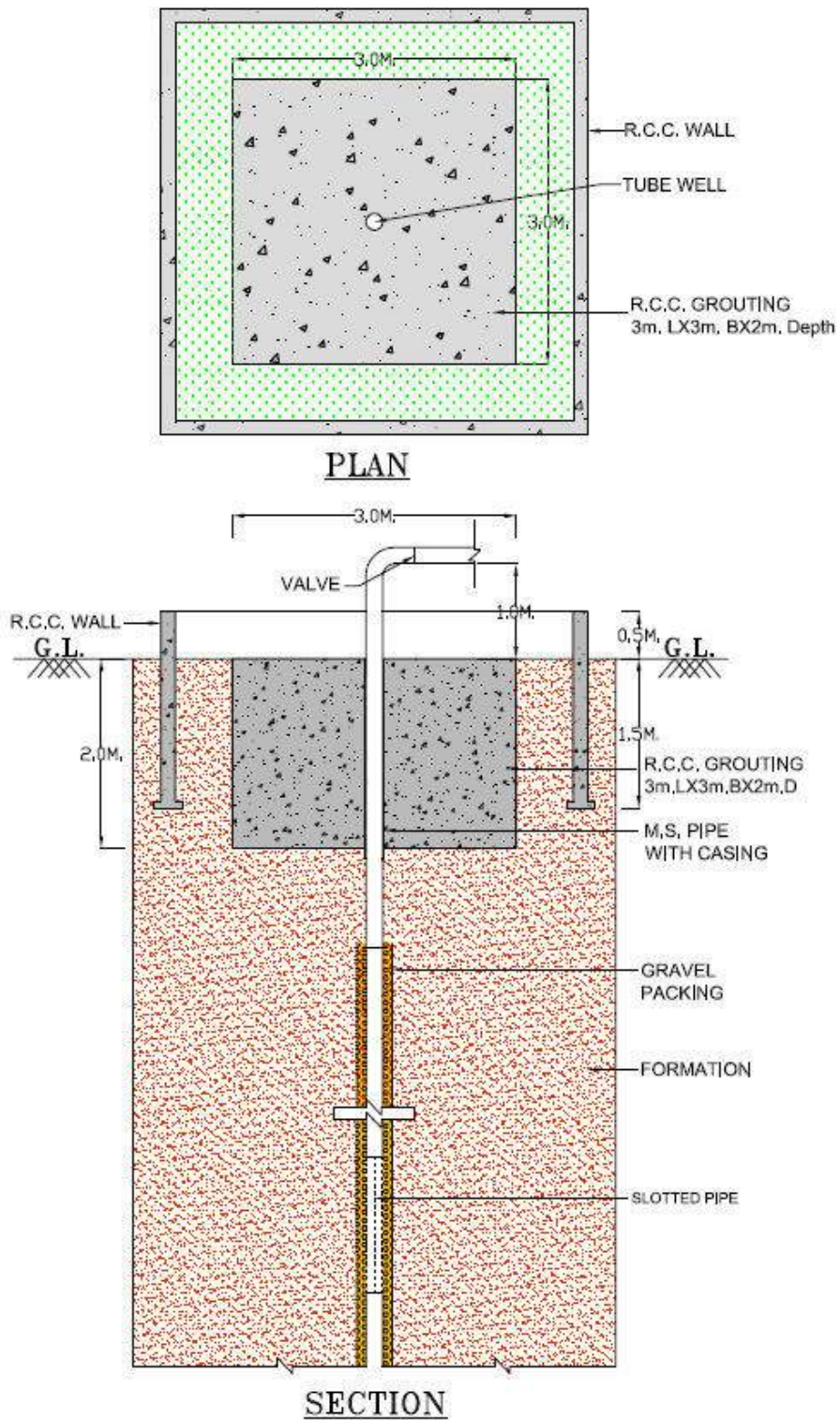
#### **प्रदूषणकारी उद्योगों / परियोजनाओं के संयंत्र परिसर में प्रदूषण की रोकथाम को सुनिश्चित करने के लिए अपनाए जाने वाले उपाय**

यह देखा गया है कि चर्मशोधन, स्लॉटर हाउस, डाई, केमिकल, कोलवाशरी, अन्य खतरनाक इकाइयों/आदि जैसे प्रदूषित उद्योगिक स्थलों में और इसके आसपास के क्षेत्रों में भूजल प्रदूषित होता है। भूजल की गुणवत्ता में और अधिक गिरावट को रोकने के लिए आवश्यक है कि इसको संरक्षित करने के सभी जरूरी उपाय किए जाएं। इस श्रेणी के अंतर्गत आने वाले सभी उद्योग / परियोजनाओं को मौजूदा और नई श्रेणी दोनों के तहत निम्नलिखित प्रक्रिया का पालन करने का निर्देश दिया जाता है।

1. किसी भी नलकूप / बोरवेल / कुएं का निर्माण प्रसंस्करण इकाई के आसपास के क्षेत्र में नहीं किया जाना चाहिए। नलकूप / बोरवेल का निर्माण उस स्थान पर किया जाना चाहिए जहां स्वच्छता हो।
2. असेंबली / केसिंग और पीवीसी (पॉली विनाइल क्लोराइड) के लिए केवल हल्के स्टील पाइप का उपयोग किया जाना चाहिए या इस तरह के अन्य पाइप का उपयोग नहीं किया जाना चाहिए। पीवीसी या इसी तरह के दूसरे पाइप वाले ट्यूबवेल / बोरवेल को छोड़ दिया जाना चाहिए और उसे भर देना चाहिए।
3. नलकूप / बोरवेल के आसपास, आरसीसी (प्रबलित कंक्रीट सीमेंट) 3 मीटर (लंबाई) x 3 मीटर (चौड़ाई) x 2 मीटर (गहराई) की ग्राउटिंग की जानी चाहिए। नलकूप / बोरवेल के पाइप को जमीन के स्तर (1 एमएजीएल) से 1 मीटर ऊपर उठाया जाना चाहिए। किसी भी सतही संदूषण को रोकने के लिए नलकूप / बोरवेल को 0.5 मीटर ऊंचाई और 1.5 मीटर गहराई की आरसीसी दीवार से घिरा होना चाहिए जिससे निर्माणाधीन ट्यूबवेल / बोरवेल में संदूषण को रोका जा सके। योजना / अनुभागीय आरेख को संदर्भ के लिए (परिशिष्ट 1 और 2) में संलग्न किया गया है।
3. नलकूप / बोरवेल में नॉन रिटर्न वॉल्व लगाया जाना चाहिए जिससे यह सुनिश्चित हो सके कि निर्मित नलकूप / बोरवेल का उपयोग केवल भूजल निष्कर्षण के लिए किया जाता है।
4. किसी भी समय निर्माणाधीन नलकूप / बोरवेल / पाईजोमीटर में जल या तरल पदार्थ नहीं जाना चाहिए।
5. इस श्रेणी के अंतर्गत आने वाले उद्योगों / परियोजनाओं को संयंत्र परिसर के भीतर किसी भी तरह के पुनर्भरण उपाय लागू नहीं करने चाहिए।
6. एसटीपी (सीवेज ट्रीटमेंट प्लांट) या ईटीपी (एफ्लुएंट ट्रीटमेंट प्लांट) के आसपास के क्षेत्र में स्थित किसी भी नलकूप / बोरवेल को छोड़ दिया जाना चाहिए और उसे भर देना चाहिए।
7. निगरानी के उद्देश्य से बनाए जाने वाले पाईजोमीटर में नलकूप / बोरवेल के निर्माण में अपनाई जाने वाली प्रक्रिया का पालन होना चाहिए।

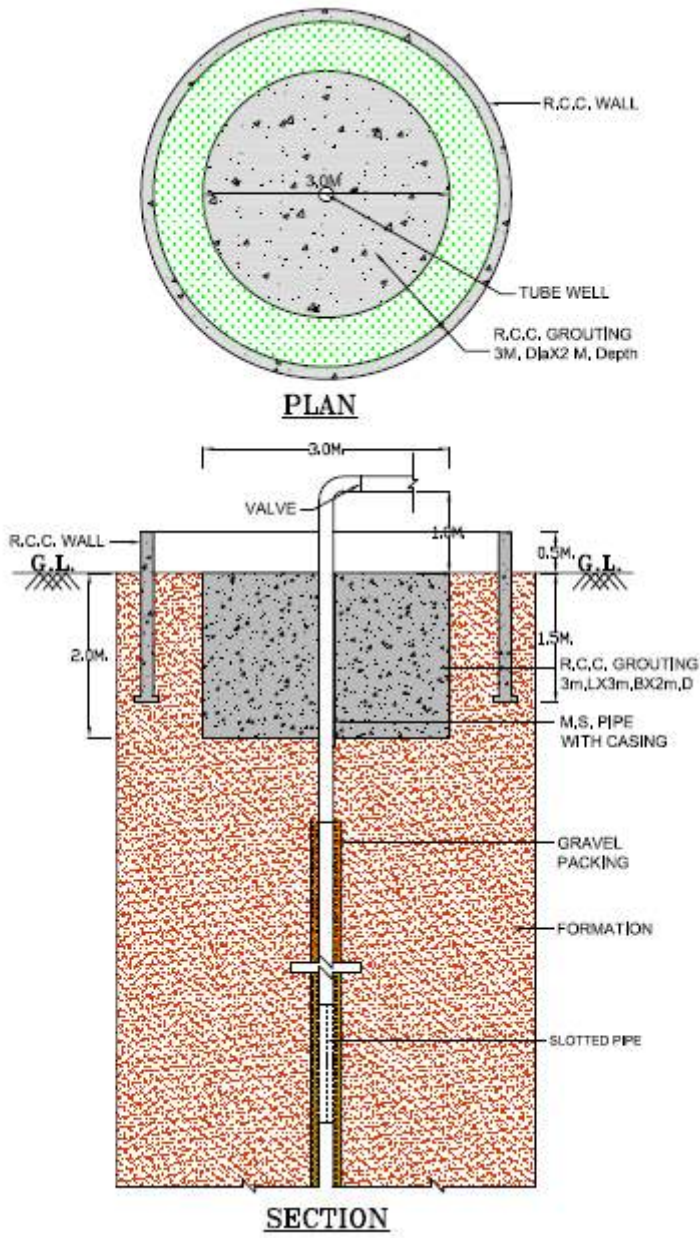
परिशिष्ट 1

कुएं की ऊपरी हिस्से को सुरक्षित करने की योजना / अनुभागीय आरेख



परिशिष्ट 2

कुएं की ऊपरी हिस्से को सुरक्षित करने की योजना / अनुभागीय आरेख



## अनुबंध- IV

**उद्योगों द्वारा एनओसी प्राप्त करने के लिए हाइड्रो-जियोलॉजिकल रिपोर्ट की रूपरेखा**

1. प्रस्तावित परियोजना के बारे में परियोजना क्षेत्र का सीमांकन करते हुए इसकी जगह का विवरण, निर्देशांक, गूगल / टोपोशीट मानचित्र आदि का संक्षिप्त विवरण।
2. परियोजना और उसके आसपास के क्षेत्र में जल स्तर और इसकी गुणवत्ता के आंकड़ों एवं नक्शों सहित इससे जुड़े मुद्दों को शामिल करते हुए भूजल की स्थिति, यदि कोई हो। खदान के मामले में, कोर और बफर ज़ोन दोनों में भूजल स्थिति का वर्णन किया जाना चाहिए।
3. प्रस्तावित निर्माणाधीन ट्यूबवैल / बोरवेल का विवरण। इसमें ड्रिलिंग गहराई, व्यास, संभावित लिथोलॉजिकल लॉग, कम किए जाने वाले पंप का विवरण, पंप का एच.पी., नलकूपों / बोरवेलों की संभावित निकासी आदि को शामिल किया जाता है। जगहों को साइट योजना / मानचित्र पर चिह्नित किया जाना चाहिए। प्रस्तावित पाईजोमीटर की जगह।
4. परियोजना और उसके आसपास क्षेत्र में किए गए जियो-फिजिकल अध्ययनों का विवरण। परियोजना वाले ब्लॉक में भूजल संसाधन की गणना।
5. खदानों के मामले में स्वीकृत खदान योजना और खान / इंफ्रास्ट्रक्चर परियोजनाओं के मामले में विस्तृत डि-वाटरिंग परियोजनाएं।
6. खनन / इंफ्रास्ट्रक्चर डि-वाटरिंग परियोजनाओं के मामले में पंप किए गए जल का प्रस्तावित उपयोग।
7. परियोजना और उसके आसपास क्षेत्र में भूजल पर पड़ने वाले प्रभाव का व्यापक मूल्यांकन और इसके जोखिमों को उजागर करते हुए किसी भी महत्वपूर्ण पर्यावरणीय मुद्दों के समाधान के लिए प्रस्तावित प्रबंधन रणनीतियां।
8. लवणता युक्त जल निकालने वाले उद्योगों द्वारा अपशिष्ट जल के निपटान के लिए प्रस्तावित उपाय।
9. जल संरक्षण के लिए अपनाए जाने वाले उपायों में रि-साइक्लिंग, पुनः उपयोग, शोधन आदि उपाय शामिल हैं, इसमें फर्म द्वारा अपनाए जा रहे जल संतुलन चार्ट के साथ-साथ अपनाए जाने वाले जल संरक्षण के तरीके भी शामिल रहते हैं।
  - परियोजना के अंतर्गत मौजूदा / प्रस्तावित एसटीपी / ईटीपी / सीईपीटी की क्षमता और प्रवाह चार्ट का संक्षिप्त लेख।
  - भूजल बचाने के लिए अपनाए जाने वाले जल संरक्षण उपायों का विवरण।
  - विभिन्न प्रक्रियाओं में जल के उपयोग को दर्शाने वाला कुल जल संतुलन चार्ट।
10. परियोजना से संबंधित कोई अन्य विवरण।

## अनुलग्नक-V

## भूजल स्थितियों पर रिपोर्ट का फॉर्मेट

- परिचय
- परियोजना वर्णन
- पृष्ठ भूमि
- लक्ष्य और अवसर
- क्षेत्रीय व्यवस्था
- स्थान
- भूमि उपयोग
- जलवायु
- स्थालाकृति और जल निकास
- भूविज्ञान-क्षेत्रीय और स्थानीय

- सामान्य हाइड्रोज्योलॉजी (जलीय प्रकार, जलीय गहराई, जोन टेप- किया गया आदि) भूजल स्थिति (कोर और बफर जोन में)  
भूजल गुणवत्ता के जल स्तर में स्थानिक और लैकिक भिन्नता (छिछला और गहरा जलभृत)
- स्थानीय भूजल पर भूजल निष्कर्षण का प्रभाव जल स्तर का जलारेख/निगरानी कुओं में दाबमापी ऐतिहासिक और जल स्तर के प्रचलन विश्लेषण शुद्ध विश्लेषण है। (भूजल के बहाव की दिशा)  
अनुमोदित खनन योजना के अनुसार वर्षावार/बेंचवार खनन जल निष्कासन का अभिकलन
- निष्कर्ष

#### अनुलग्नक-VI

परियोजनाओं के आधारभूत संरचना का निर्देशात्मक सूची

वाणिज्यिक इमारतों सहित आवासीय नगर क्षेत्र

कार्यालय इमारत

विद्यालय कॉलेज

विश्वविद्यालय

सेज

मेट्रो स्टेशन

बस डिपो

हाइवे आधार भूत संरचना

दमकल केन्द्र

गोदाम

व्यापार प्लाजा

मॉल और मल्टीप्लेक्स

अस्पताल

नर्सिंग होम

रिजॉर्ट

होटल/रेस्टोरेन्ट/फुड प्लाजा

होलीडे होम/अतिथि गृह/छात्रावास

बैंकवेट हॉल/

मैरिज गार्डन

आईटी कॉम्प्लेक्स

आईटी कॉम्प्लेक्स

लॉजिस्टिक एण्ड कारगो

क्लबस

व्यापार केन्द्र

## अनुलग्नक-VII

2009 के सिविल रिट याचिका में सुपरिम कोर्ट के आदेश में परिव्यक्त वेध कूपों और नल कूपों में उनके गिरने के कारण छोटे बच्चों के घातक दुर्घटनाओं के रोकथाम के लिए पैमाना जवाब में परिव्यक्त वेध कूपों और नल कूपों में उनके गिरने के कारण छोटे बच्चों के घातक दुर्घटनाओं के रोकथाम के लिए पैमाना भारतीय संघ और संगठन उत्तर देने वाला आदेश वर्तमान रिट याचिका में कुछ नहीं है, विषय में हल्के, इसके साथ न्यायालय के आदेश दिनांक 11 फरवरी, 2010के जारी किये गए आपेक्षित दिशा-निर्देश देखिए।

वह संशोधन इस प्रकार है:

- i) जमीन/परिसर के मालिक को वेध कूप/नल कूप बनाने के लिए कोई कदम उठाने से पहले क्षेत्र में संबंधित अधिकारी को लिखित में सूचना देना चाहिए, जो है, जिलाधिकारी, जिला मजिस्ट्रेट/ग्राम पंचायत के सरपंच/कोई अन्य सांघिक अधिकारी/भूजल विभाग के संबंधित अधिकारी/लोक स्वास्थ्य/नगर निगम, जैसा मामला हो सकता है, वेध कूप/नल कूल के निर्माण के लिए।
- ii) सभी ड्रिलिंग एजेंसियों का पंजीयन, मुख्यतः सरकारी/अर्द्ध सरकारी निजीइत्यादि जिला प्रशासन/वैधानिक अधिकारी जहां भी लागू हो के साथ अनिवार्य होना चाहिए।
- iii) निम्नलिखित विवरण के साथ कुएं के समीप निर्माण के समय पर सूचना पट्ट की स्थापना:-
  - (क) कुएं के सुधार/निर्माण के समय पर ड्रिलिंग एजेंसी का पूरा पता।
  - (ख) कुएं के मालिक/उपयोग करने वाले एजेंसी का पूरा पता
- iv) निर्माण के दौरान कुएं के चारों ओर कांटेदार तार घेराबंदी या कोई अन्य उपयुक्त घेरा का स्थापना।
- v) कुएं के चारों ओर के आवरण से (0.30 मीटर जमीन स्तर से ऊपर और 0.30 मीटर जमीन स्तर से नीचे) 0.50x0.50x0.60 मीटर की दूरी पर कोंक्रीट प्लेट फार्म/सिमेंट का निर्माण।
- vi) बोल्ट्स और नट्स के साथ पाइप के आवरण को फिक्स करने के लिए मजबूत कैप उपलब्ध कराते हुए स्टील की वेल्डिंग द्वारा कुएं के सज्जीकरण का कैपिंग।
- vii) पम्प मरम्मत के मामले में नल कूल को खुला नहीं छोड़ना चाहिए।
- viii) कार्य के पूरे होने के पश्चात् कीचड के गडेड और नाली को भरना।
- ix) परित्यक्त वेध कूपों को नीचे से जीमन स्तर तक मिट्टी/रेत/पत्थर/कंकड/ड्रिल कटिंग आदि से भरना।
- x) खास जगह पर ड्रिलिंग प्रचालन के पूरे होने पर, ड्रिलिंग के शुरू होने से पहले जमीन के स्थिति का मरम्मत करना।
- xi) जिलाधिकारी को सत्यापित करने अधिकार होना चाहिए कि उपरोक्त निशा-निर्देश को अनुसरण ओर उचितनिगरानी किया जा रहा है, केन्द्रीय सरकार एजेंसियों/संबंधित राज्य द्वारा नल कूपों/वेध गडडों की स्थिति के विषय में जांच का ख्याल रखा जा रहा है।
- xii) जिला स्तर पर जिला/प्रखण्ड/ग्राम-वार ड्रिल्ड नल कूपों/वेध कूपों की स्थिति जिला/प्रखण्ड/ग्राम-वार अर्थात् उपयोग में कूपों की संख्या, परित्यक्त वेध कूप/खूले पायेगए नल कूपों की संख्या, परित्यक्त वेध कूपों/जमीनी स्तर तक उचितसे भरे गए नल कूपों और परित्यक्त वेध कूपों/जमीनी स्तर तक भरे गये नल कूपों को बनाए रखा जाता है।  
ग्रामीण क्षेत्रों में उपरोक्त निगरानी कृषि विभाग से कार्यपालक और ग्राम सरपंच द्वारा किया जाता है। गहरी क्षेत्र के मामले में, उपरोक्त निगरानी कनिष्ठ अभियंता और संबंधित भूजल विभाग से कार्यपालक/लोक स्वास्थ्य/नगर निगम आदि द्वारा किया जाता है।
- xiii) यदि कोई स्तर पर परित्यक्त वेध कूप/नल कूप है, तो संबंधित भूजल विभाग/लोक स्वास्थ्य/नगर निगम/निजी ठेकेदार आदि से एक प्रमाण पत्र पूर्व कथित एजेंसी द्वारा लेनी चाहिए कि परित्यक्त वेध कूल और नल कूप उचितरूप से जमीन स्तर तक भरा गया। संबंधित विभाग/एजेंसी के कार्यपालक द्वारा बिना सोचे समझे जांच किया जाना है। उपरोक्त एसी सभी आंकडों की सूचना राज्य के प्रखण्ड विकास कार्यालय/जिला अधिकारी के पास उपलब्ध होनी है।

हमें सूचना दिया गया कि दिनांक 11 फरवरी, 2010 के पहले आदेश का अंतिम पैराग्राफ से संबंधित पब्लिसिटी का विधिवत अनुपालन किया गया है।

उपरोक्त के अधिन, रिट याचिका का निपटारा किया गया है।

.....सीजेआई

[एस.एच.कपाडिया]

.....

के.एस. राधाकृष्णन

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स्वतंत्र कुमार

नई दिल्ली,

06 अगस्त, 2010

अनुलग्नक-VIII

सीजीडब्ल्यूए द्वारा राज्यों/संघीय प्रदेशों की सूची जहां भूजल निकर्षण नियंत्रित किया जाता है-

1. अंडमान और निकोबार
2. असम
3. अरुणाचल प्रदेश
4. बिहार
5. छत्तीसगढ़
6. दादर और नगर हवेली और दमन और द्वीव
7. गुजरात
8. हरियाणा
9. झारखंड
10. मध्य प्रदेश
11. महाराष्ट्र
12. मणीपुर
13. मेघालय
14. मिजोरम
15. नागालैंड
16. ओडिशा
17. पंजाब
18. राजस्थान
19. सिक्किम
20. त्रिपुरा
21. उत्तर प्रदेश
22. उत्तराखंड
23. आंध्र प्रदेश (केवल खनन परियोजनाएं)
24. तेलंगाना (केवल खनन परियोजनाएं)

## अनुलग्नक-IX

प्रयुक्त तकनीकी शब्दों के शब्दावली

- 1) **सुरक्षित क्षेत्र:** सीजीडब्ल्यूबी और राज्य भूजल संगठनों द्वारा संयुक्त रूप से किए गये नवीनतक भूजल संसाधनों के आकलन के आधार पर भूजल संसाधनों की दृष्टिकोण से सुरक्षित के रूप में वर्गीकृत किया गया है। एनओसीएपी और सीजीडब्ल्यूबी के वेबसाइट पर विवरण उपलब्ध है।
- 2) **अर्द्ध-नाजुक क्षेत्र:** सीजीडब्ल्यूबी और राज्य भूजल संगठनों द्वारा संयुक्त रूप से किए गये नवीनतम भूजल संसाधनों के आकलन के आधार पर भूजल संसाधनों की दृष्टिकोण और सीजीडब्ल्यूबी के वेबसाइट पर विवरण उपलब्ध है।
- 3) **नाजुक क्षेत्र:** सीजीडब्ल्यूबी और राज्य भूजल संगठनों द्वारा संयुक्त रूप से किये गये नवीनतम भूजल संसाधनों के आकलन के आधार पर भूजल संसाधनों की दृष्टिकोण से नाजुक के रूप में वर्गीकृत किया गया है। एनओसीएपी और सीजीडब्ल्यूबी के वेबसाइट पर विवरण उपलब्ध है।
- 4) **अतिदोहित क्षेत्र:** सीजीडब्ल्यूबी और राज्य भूजल संगठनों द्वारा संयुक्त रूप से किये गये नवीनतम दृष्टिकोण से अतिदोहित के रूप में वर्गीकृत किया गया है। एनओसीएपी और सीजीडब्ल्यूबी के वेबसाइट पर विवरण उपलब्ध है।
- 5) **जलभृत:** भूवैज्ञानिक संरचना भूजल संचारण और भंडारण के लिए सक्षम है।
- 6) **गहरा जलभृत:** बहुधा जलभृत प्रणाली के क्षेत्र में ऊपर वाले जलभृत के नीचे जलभृत घटित हुई।
- 7) **कुंआ:** भूजल के निष्कर्षण के लिए उपयोग किया जाने वाला कोई भी ढांचा, जिसमें खुले कुएं, खोदे गए कुएं, बोरवेल, खोदने वाले कुएं, नल कूल, फिल्टर प्वाइंट, कलेक्टर कुएं, घुसपैठ गैलरियां, रिचार्ज कुएं या उनके किसी भी संयोजन या विविधताएं शामिल हैं।
- 8) **सरकारी ऐजेंसी:** केन्द्रीय या राज्य सरकार का निकाय हो सकता है।
- 9) **आपूर्तिकर्ता :** सरकार/सरकार ने जल आपूर्ति ऐजेंसी को मंजूरी दी।
- 10) **खनन :** खनन के पश्चात् परित्यक्त क्षेत्र या क्षेत्र जहां खनन गतिविधियां चल रही हैं।
- 11) **गैर कानूनी भूजल निष्कर्षण संरचना:** केन्द्रीय जल प्राधिकरण से ठोस एनओसी के बिना भूजल को निकालने के लिए प्रयोग किया जा रहा है जो कोई ऊर्जावान निष्कर्षण संरचना है अर्थात् डगवेल, नलकूप, वैध कूप।
- 12) **वर्षाजल संचयन:** भूजल के रिचार्ज के लिए या भविष्य के उपयोग के लिए रूफ-टॉप संचयन को शामिल करते हुए सूक्ष्म जल विभाजक पैमाने पर वर्षाजल के भंडारण और जमाव की प्रणाली और तकनीक।
- 13) **खनन परियोजना:** परियोजना जो खनन गतिविधि को शामिल करती है या तो खुली कास्ट या भूमिगत या दोनों।
- 14) **भूजल प्रारूप:** भूजल निकासी का अपेक्षित मात्रा।
- 15) **लवणीय जल:** 25° से. पर 2500M साइमेन्स/से.मी. की अधिकता में लवणता वाला जल युक्त जल।
- 16) **वाटर टेबल इंटरसेक्शन :** खनन या अन्य गतिविधियों के कारण ऑवर लेईंग सामग्री की खुदाई पर जल वाटर टेबल इंटरसेक्शन।
- 17) **पेय और घरेलू उपयोग:** पेय और घरेलू उपयोग के अलावा, यह श्रेणी अस्पताल, होटल, मॉल और मल्टीप्लेक्स संस्थाने, कार्यालय बैंकेट हॉल, फायर स्टेशन, मेट्रो स्टेशन, रेलवे स्टेशन, हवाई अड्डा, बंदगाह, स्टेडियम आदि औद्योगिक प्रक्रिया के लिए आवश्यक जल नहीं बल्कि औद्योगिक के पेय जरूरतों को कवर करेगी।
- 18) **रिसाइकल/पुनः उपयोग:** विभिन्न उद्देश्यों के लिए ट्रिटेड वेस्ट जल का उपयोग/बहुल उपयोग के लिए जल को रखना।
- 19) **सरकारी विभाग :** केन्द्रीय या तो राज्य।
- 20) **नगरपालिका :** नगरपालिका, नगर निगमया अन्य दूसरे नाम द्वारा स्थानीय शहरी शासन का समान निकाय।

- 21) **भूजल** : पानी जो संतृप्ति के क्षेत्र में सतह के नीचे मौजूद है और कुओं या किसी अन्य माध्यम से निकाला जा सकता है या झरनों और नदियों में झरनों और आधार प्रवाह के रूप में उभरता है।
- 22) **बीजीएल** : जमीनी स्तर के नीचे।
- 23) **बीसएम** : बिलियन क्यूबिक मीटरस्।
- 24) **भूजल निष्कर्षण संरचना** : भूजल निकासी के लिए प्रयुक्त संरचना जैसे वैध कूल/नल कूप/डगवेल/डग कम बोर वेल/सुरंग कुआं।
- 25) **अवलोकन कुआं या पीजोमीटर** : एक बोरवेल/जल स्तर मापने के लिए केवल प्रयुक्त नल कूप/पाईजोमेट्रिक हेड और समय-समय पर पानी का नमूना लेने के किया जाता है, लेकिन भूजल पृथक्करण के लिए इसका उपयोग नहीं किया जाता है।
- 26) **वाटर ऑडिट** : पानी के उपयोग को कम करने और अक्सर अनावश्यक पानी के उपयोग पर पैसे बचाने के उद्देश्य से सरल या जटिल प्रणालियों में पानी की उपयोग की मात्रा निर्धारित करने की एक विधि।
- 27) **भूजल प्रदूषण** : यदि भूजल में किसी भी पैरामीटर की सांद्रता भारतीय मानक ब्यूरो द्वारा निर्धारित पेयजल की अधिकतम अनुज्ञेय सीमा से अधिक है।
- 28) **सहकारी समूह हाउसिंग सोसायटी/बिल्डर फ्लैट** : एक हाउसिंग सोसायटी एक आवासीय परिसर के भीतर घर के मालिकों द्वारा गठित एक सोसायटी है। गठित हाउसिंग सोसायटी को औपचारिक रूप से सहकारी समितियों के रजिस्ट्रार के साथ पंजीकृत होना चाहिए।
- 29) **केएलडी** - प्रतिदिन कि.मी
- 30) **ईसीजीडब्ल्यू** - अवैध भूजल निकासी के लिए पर्यावरण क्षतिपूर्ति।
- 31) **ईसीजीडब्ल्यूआर** – अवैध भूजल निकासी के लिए पर्यावरण क्षतिपूर्ति दर।

### अनुलग्नक-X

#### उद्योगों द्वारा वार्षिक वाटर ऑडिट (स्रोत-(11))

वाटर ऑडिट उद्देश्यपूर्ण तरीके से वितरण प्रणाली के माध्यम से जल की निकासी या उपचार के स्थल से जल के प्रवाह को मापकर और इसका उपयोग किये जाने वाले क्षेत्रों में और अंततः छोड़ दिया जाता है। वाटर ऑडिट आयोजित करने में जलके संतुलन की गणना, जल का उपयोग और जल का बचत के तरीकों की पहचान करना शामिल है।

वाटर ऑडिट में प्रारंभिक जल सर्वेक्षण और विस्तृत जल लेखा शामिल है। प्रारंभिक जल सर्वेक्षण संयंत्र गतिविधियों, जल की खपत और जल निर्वहन पैटर्न और जल बिलिंग, दरों और जल उपकरण के बोर में पृष्ठभूमि की जानकारी एकत्र करने के लिए किया जाता है। उद्योग से एकत्र किए गए माध्यमिक आंकड़ों के विश्लेषण के बाद, विस्तृत जल ऑडिट आयोजित की जाती है, जिसमें निम्नलिखित चरण शामिल है:-

- साइट पर प्रशिक्षण और सुविधा प्रबंधक और कर्मियों के साथ चर्चा
- जल प्रणाली विश्लेषण
- आधारभूत जल मानचित्र का परिमाण
- दबाव और प्रवाह मीटर और विभिन्न अन्य उपकरणों का उपयोग करके निगरानी और माप
- अक्षमताओं और लीक की मात्रा
- पानी की गुणवत्ता लोड और निर्वहन की मात्रा

- प्रवाह और गुणवत्ता मानकों में परिवर्तनशीलता की मात्रा
- जल उपचार और पुनः उपयोग का प्रत्यक्ष उपयोग के लिए रणनीतियां।

एक विस्तृत जल संतुलन आखिरकर विकसित होता है। विभिन्न विभिन्न उपयोगकर्ता क्षेत्रों में पानी की गुणवत्ता की आवश्यकता गैप की गई है, जो रीसाइकल और पुनः उपयोग के अवसरों को विकसित करने में मदद करता है।

विस्तृत वाटर ऑडिट रिपोर्ट में निम्नलिखित शामिल हैं:

- पानी की खपत और अपशिष्ट जल उत्पादन पैटर्न
- विशिष्ट जल का उपयोग संरक्षण
- सुविधाका पूर्ण जल संतुलन
- जल के बचत के अवसर
- प्रस्तावों को लागू करने की विधि
- पूर्ण विवरण और आंकड़ें
- निवेश की आवश्यकता

जल संरक्षण के लिए उद्योग निम्नलिखित उपाय कर सकते हैं:-

- जल बजट के लिए मानदंड स्थापित करना
- जल के खपत को कम करने के लिए औद्योगिक प्रक्रिया का आधुनिकीकरण
- पुनः परिसंचारी शीतलन प्रणाली के साथ पुनर्चक्रित जल
- ओजोनेशन कूलिंग वाटर एप्रोच जिसके परिणाम स्वरूप पारंपरिक रासायनिक उपचार की तुलना में पांच गुना कमी हो सकती है।
- कुल प्लेनम फ्लश को समाप्त करके डी आयोनाइज्ड जल के पुनः उपयोग में कभी, निरंतर प्रवाह से एक आंतरिक प्रवाह प्रणाली में परिवर्तन करना और उपयोग पर नियंत्रण में सुधार करना
- बागवानी के लिए अपशिष्ट जल का उपयोग
- निपटान के मानदंडों का पालन करने के लिए अपशिष्टों का उचित प्रसंस्करण।

**MINISTRY OF JAL SHAKTI**  
**(Department Of Water Resources, River Development And Ganga Rejuvenation)**  
**(CENTRAL GROUND WATER AUTHORITY)**

**NOTIFICATION**

New Delhi, the 24th September, 2020

**S.O. 3289(E).**—WHEREAS, on the directions of Hon'ble Supreme Court vide its order dated the 10th December, 1996 passed in Civil writ Petition No 4677 of 1985, MC Mehta Vs Union of India, the Central Government constituted the Central Ground Water Authority (hereafter referred to as the 'Authority') vide notification number S.O. 38 (E), dated the 14<sup>th</sup> January, 1997 to exercise powers under Section 5 of the Environment (Protection) Act, 1986 (29 of 1986) for the purposes of regulation and control of Ground Water management and development and to exercise certain powers and perform certain functions relating thereto;

AND WHEREAS, the Authority has been regulating ground water development and management by way of issuing 'No Objection Certificates' for ground water extraction to industries or infrastructure projects or Mining Projects etc., and framed guidelines in this connection from time to time in twenty two States and two Union territories, where ground water development is not being regulated by the State Government Union Territory administration concerned;

AND WHEREAS, some of the State Governments or, Union territories enacted legislations and issued regulatory directions or orders for regulating ground water development and management;

AND WHEREAS, the Hon'ble National Green Tribunal, New Delhi vide order dated the 15<sup>th</sup> April 2015 in OA Nos. 204/205/206 of 2014 has issued directions to the Authority to ensure that any person operating tube-well, or any means to extract ground water shall obtain permission from the Authority and shall operate the same subject to the law in force, even if such unit is existing unit or the unit is yet to be established;

AND WHEREAS, the said Hon'ble Tribunal vide its order dated the 09<sup>th</sup> July, 2015 in OA Nos. 34 and 37 of 2014 directed all industrial units which are members of the Common Effluent Treatment Plants (CETPs) to approach the Authority through State Pollution Control Board for obtaining 'No Objection Certificate' in accordance with the law;

AND WHEREAS, the aforesaid Hon'ble Tribunal vide order dated the 13<sup>th</sup> July, 2017 in OA No 200- of 2014 directed that every industry should be directed to pay for extraction of such water, that too, subject to the conditions stated in the order permitting such extraction;

AND WHEREAS, the said Hon'ble Tribunal vide its order dated the 28<sup>th</sup> August, 2018 in O.A. Nos. 176 of 2015 and 59 of 2012 respectively directed the Ministry of Water Resources, River Development and Ganga Rejuvenation to forthwith review the existing mechanism so as to ensure effective steps for conserving the groundwater resources;

AND WHEREAS, in pursuance of the directions of the Hon'ble National Green Tribunal and powers conferred by sub-section (3) of section 3 and section 5 of the Environment (Protection) Act, 1986 the Authority, with a view to protect the ground water resources had circulated the draft guidelines for grant of 'No Objection Certificate' on the 11<sup>th</sup> October, 2017 inviting comments and suggestions from all the stakeholders;

AND WHEREAS, all objections and suggestions received in response to the said draft guideline have been duly considered by the Central Government, the Authority notified the guidelines to regulate groundwater over-exploitation and to conserve the groundwater resources in the country vide notification number S.O. 6140 (E), dated the 12<sup>th</sup> December, 2018;

AND WHEREAS, the aforesaid Hon'ble Tribunal vide order dated the 03<sup>rd</sup> January 2019 in the OA No. 176 of 2015 directed that the above mentioned notification dated the 12<sup>th</sup> December, 2018 may not be given effect to as it is unsustainable if tested on 'Precautionary Principle, Sustainable development as well as Inter-generational Equity Principles' and if implemented, will result in fast depletion of groundwater and damage to water bodies and will be destructive of the fundamental right to life under Article 21 of the Constitution of India;

AND WHEREAS, the said Hon'ble Tribunal vide order dated the 11<sup>th</sup> September, 2019 constituted a committee to deliberate on steps for preventing depletion of groundwater, robust monitoring mechanism

against unauthorised extractions and fulfillment of 'No Objection Certificate' conditions, environment compensation etc and to submit a report;

AND WHEREAS, the aforesaid committee submitted the report along-with draft guidelines to regulate groundwater extraction and groundwater conservation in Hon'ble Tribunal on the 16<sup>th</sup> March, 2020;

AND WHEREAS, the above said Hon'ble Tribunal vide order dated the 20<sup>th</sup> July, 2020 directed to comply with certain points for sustainable groundwater management while issuing 'No Objection Certificates' to commercial establishments by the Authority;

Now therefore, in pursuance of the directions of Hon'ble National Green Tribunal and the powers conferred by sub-section (3) of Section 3 read with Section 5 of the Environment (Protection) Act, 1986 (29 of 1986), the Department of Water Resources, River Development & Ganga Rejuvenation, hereby notifies the guidelines to regulate and control groundwater extraction in the country in supersession to this Ministry notification vide S.O. 6140 (E), dated the 12<sup>th</sup> December, 2018 as per the Schedule below:

### **SCHEDULE**

#### **Guidelines to regulate and control ground water extraction in India**

(with immediate effect)

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[F. No. CGWA-21/4/2020-CGWA]

ASHISH KUMAR, Director

**ANNEXURES**

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- Annexure IX: Glossary of technical terms used
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**Guidelines to regulate and control groundwater extraction in India****Preamble and Background:**

On the directions of Hon'ble Supreme Court vide its order dated 10th December, 1996 passed in Civil writ Petition No 4677 of 1985, MC Mehta Vs Union of India, the Central Government had constituted the Central Ground Water Board as Authority vide notification number S.O. 38 (E), dated the 14<sup>th</sup> January, 1997 to exercise powers under sub section (3) of section 3 of the Environment (Protection) act, 1986 (29 of 1986) for the purposes of regulation and control of Ground Water Management and Development and to exercise certain powers and perform certain functions as per the said Act.

The Authority has been regulating ground water development and management by way of issuing 'No Objection Certificates' for ground water extraction to industries or infrastructure projects or Mining Projects etc., and framed guidelines in this connection from time to time applicable in twenty two States and two Union territories, where ground water development is not being regulated by the State Government and Union territory administration concerned.

To have sustainable management of water resources in the country groundwater abstraction guidelines have been prepared to regulate groundwater extraction and conserve the scarce groundwater resources in the country.

These guidelines will come into force with immediate effect from the date of Gazette Notification and will supersede all earlier guidelines issued by the Central Ground Water Authority (CGWA).

These guidelines will have pan India applicability. Ground water abstraction in States/ Uts (which are not regulating ground water abstraction) shall continue to be regulated by Central Ground Water Authority.

Further, wherever States/ Uts have come out with their own groundwater abstraction guidelines, which are inconsistent with the CGWA guidelines, the provisions of CGWA guidelines will prevail. However, in case the guidelines followed by such States/ Uts contain some more stringent provisions than CGWA guidelines, such provisions may also be given effect to by the States/ Uts Authorities in addition to those contained in the CGWA guidelines. States may be at liberty to suggest additional conditions/ criteria based on the local hydro-geological situations which shall be reviewed by CGWA/Ministry of Jal Shakti, Government of India before acceptance.

All new/existing industries, industries seeking expansion, infrastructure projects and mining projects abstracting ground water, unless specifically exempted under Para 1.0 below, will be required to seek No Objection Certificate from Central Ground Water Authority or, the concerned State/ UT Ground Water

Authority as the case may be. The entire process of grant of No Objection Certificate shall be online through a web based application system.

Water management plans shall be prepared by all the State Ground Water Authorities/ Organizations for all Over-exploited, Critical and Semi-critical assessment units starting with Over-exploited units. Water management plans shall be reviewed and updated periodically. Water management plans, data on water availability and scarcity and policy framed in this regard shall be placed on the websites of Central Ground Water Authority/ State Ground Water Authority.

### **1.0 Exemptions from seeking No Objection Certificate:**

Following categories of consumers shall be exempted from seeking No Objection Certificate for ground water extraction:

- (i) Individual domestic consumers in both rural and urban areas for drinking water and domestic uses.
- (ii) Rural drinking water supply schemes.
- (iii) Armed Forces Establishments and Central Armed Police Forces establishments in both rural and urban areas.
- (iv) Agricultural activities.
- (v) Micro and small Enterprises drawing ground water less than 10 cum/day.

### **1.1 Registration of Drilling Rigs**

State / Ut Governments shall be responsible for registering drilling rigs operating within their jurisdiction and for maintaining the database of wells drilled by them. Appropriate link shall be provided in CGWA portal for making the data available to CGWA.

### **2.0 Drinking & Domestic use for Residential apartments/ Group Housing Societies/ Government water supply agencies in urban areas**

For grant of No Objection Certificate for ground water extraction, the project proponent has to furnish the details as per the guidelines issued by the CGWA in proper format as available in CGWA website. No Objection Certificate for new /existing wells shall be granted only in such cases where the local Government water supply agency is unable to supply requisite amount of water in the area.

No Objection Certificate shall be granted subject to the following specific conditions:

- i) Installation of Sewage Treatment Plants shall be mandatory for all residential apartments/ Group Housing Societies where ground water requirement is more than 20 m<sup>3</sup>/day. The water from Sewage Treatment Plants shall be utilized for toilet flushing, car washing, gardening etc.
- ii) The No Objection Certificate shall be valid for a period of five years from the date of issue or till such time local Government water supply is provided to the project area, whichever is earlier. In case the project proponent receives water supply from the concerned local Government Water Supply Agency during the validity of the No Objection Certificate, intimation regarding availability of public water supply shall be sent by the project proponent to CGWA and No Objection Certificate will be cancelled by the Authority. In other cases, the project proponent will apply for renewal of No Objection Certificate, ninety days before the expiry of No Objection Certificate.
- iii) Proponents shall be liable to pay ground water abstraction charges for the quantum of ground water proposed to be extracted, as per rates mentioned in Table 5.1.

### **Documents to be submitted with the application**

- a) Details of water requirement computed as per National Building Code, 2016 (**Annexure I**), taking into account recycling/ reuse of treated water for flushing etc.
- b) Affidavit on non-judicial stamp paper of Rs. 10/- by the applicant, confirming non/ inadequate availability of public water supply in case of users requiring ground water up to 10 m<sup>3</sup>/ day for drinking/ domestic use.
- c) Certificate of non-availability of water from local government water supply agency in cases requiring ground water in excess of 10 m<sup>3</sup>/ day for drinking/ domestic use. Government water supply agencies

applying for No Objection Certificate shall submit copy of government approval of the scheme/project proposed to be implemented.

- d) Ground water quality data of existing bore well/ tube well/ dug well from any National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratory or Govt. approved laboratory (in case of existing projects applying for no objection certificate)
- e) Proposal for rain water harvesting/ recharge within the premises as per Model Building Bye Laws issued by Ministry of Housing & Urban Affairs.

### 3.0 Agriculture Sector

Agriculture sector is the backbone of the Indian economy. As per Minor Irrigation Census 2013-14, 87.86% of wells are owned by marginal, small and semi-medium farmers having land holding up to 4 hectares (ha). Around 9.18 % of wells are owned by medium farmers having land holding 4 – 10 ha and 2.96% of the wells are owned by big farmers having land holding more than 10 ha.

Considering the number of ground water abstraction structures, regulation of ground water in agriculture sector through a 'command and control' strategy will prove to be an arduous task. Therefore, a participatory approach for sustainable ground water management would be more productive.

States/Uts are advised to review their free/subsidized electricity policy to farmers, bring suitable water pricing policy and may work further towards crop rotation/diversification/other initiatives to reduce over-dependence on groundwater.

Agriculture sector shall be exempted from obtaining No Objection Certificate for ground water extraction.

### 4.0 Commercial Use

No new major industries shall be granted No Objection Certificate in over-exploited assessment areas except as per the policy guidelines.

Availability of ground water resources shall be given due regard while considering applications for grant of No Objection Certificate for commercial use.

Commercial entities extracting ground water shall be required to submit online annual water audit report including an audit of water use as mentioned in the relevant sections. CGWA/ State Ground Water Authority (SGWA) shall publish all such audit reports online.

CGWA/ SGWAs shall engage independent agencies to verify the compliance of No Objection Certificate conditions periodically.

#### 4.1 Industrial Use

In Over-exploited assessment units, No Objection Certificate shall not be granted for ground water abstraction to any new industry except those falling in the category of Micro, Small and Medium Enterprises (MSME). However, No Objection Certificate for drinking/ domestic use for work force, green belt use by these new industries shall be permitted. Expansion of existing industries involving increase in quantum of ground water abstraction in over-exploited assessment units shall not be permitted. No Objection Certificate shall not be granted to new packaged water industries in Overexploited areas, even if they belong to MSME category.

No Objection Certificate for ground water extraction by industries shall be granted subject to the following specific conditions:

- i) No Objection Certificate shall be granted only in such cases where local government water supply agencies are not able to supply the desired quantity of water.
- ii) All industries shall be required to adopt latest water efficient technologies so as to reduce dependence on ground water resources.
- iii) All industries abstracting ground water in excess of 100 m<sup>3</sup>/d shall be required to undertake annual water audit through Confederation of Indian Industries (CII)/ Federation Indian Chamber of Commerce and Industry (FICCI)/ National Productivity Council (NPC) certified auditors and submit audit reports within three months of completion of the same to CGWA. All such industries shall be

- required to reduce their ground water use by at least 20% over the next three years through appropriate means.
- iv) Construction of observation well(s) (piezometer)(s) within the premises and installation of appropriate water level monitoring mechanism as mentioned in Section 15 shall be mandatory for industries drawing/ proposing to draw more than 10 m<sup>3</sup>/day of ground water and. Monitoring of water level shall be done by the project proponent. The piezometer (observation well) shall be constructed at a minimum distance of 15 m from the bore well/production well. Depth and aquifer zone tapped in the piezometer shall be the same as that of the pumping well/ wells. Detailed guidelines for design and construction of piezometers are given in **Annexure II**. Monthly water level data shall be submitted to the CGWA through the web portal.
  - v) The proponent shall be required to adopt roof top rain water harvesting/ recharge in the project premises. Industries which are likely to pollute ground water (chemical, pharmaceutical, dyes, pigments, paints, textiles, tannery, pesticides/ insecticides, fertilizers, slaughter house, explosives etc.) shall store the harvested rain water in surface storage tanks for use in the industry.
  - vi) Injection of treated/ untreated waste water into aquifer system is strictly prohibited.
  - vii) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution (**Annexure III**).
  - viii) All industries drawing ground water in safe, semi-critical and critical assessment units shall be required to pay ground water abstraction charges as applicable as per Tables 5.2 A and 5.3 A.
  - ix) All existing industries drawing ground water in over-exploited assessment units shall be liable to pay ground water restoration charges as applicable as per Tables 5.2 B and 5.3 B.

#### **Documents to be submitted with the application**

- (a) An affidavit on non judicial stamp paper of Rs. 10/- regarding non availability of water supply from local government agencies in cases where ground water requirement is up to 10 m<sup>3</sup>/day.
- (b) Certificate regarding non/ partial availability of fresh water/ treated waste water supply from the local government water supply agency in cases where requirement of ground water is more than 10 m<sup>3</sup>/day.
- (c) Ground water quality data of existing bore well/ tube well/ dug well from any NABL accredited laboratory or Govt. approved laboratory (in case of existing projects applying for No Objection Certificate)
- (d) Water quality data of bore well/ tube well/ dug well in respect of existing industries from NABL accredited laboratories/Government approved laboratories.
- (e) Proposal for rain water harvesting/ recharge within the premises as per Model Building Bye Laws issued by Ministry of Housing & Urban Affairs.
- (f) **Impact Assessment report:** All projects extracting/proposing to extract ground water in excess of 100 m<sup>3</sup>/day in Over-exploited, Critical and Semi-critical areas shall have to mandatorily submit impact assessment report of existing/ proposed ground water withdrawal on the ground water regime and also socio-economic impacts report prepared by accredited consultants. Pro-forma for the report is given in **Annexure IV**.

#### **4.2 Mining Projects**

All existing as well as new mining projects will be required to obtain No Objection Certificate for ground water abstraction. Since mining projects are location specific, there will be no ban on grant of No Objection Certificate for abstraction of ground water for such projects in over-exploited assessment units.

No Objection Certificate for mining projects shall be granted subject to the following specific conditions:

- i) It shall be mandatory for all the mining industries to ensure that water available from de-watering operations is properly treated and should be gainfully utilized for supply for irrigation, dust

suppression, mining process, recharge in downstream and for maintaining e-flows in the river system.

- ii) Construction of observation well(s) (piezometers) along the periphery in the premises, for monthly ground water level monitoring, shall be mandatory for mines drawing/ proposing to draw more than 10 m<sup>3</sup>/day of ground water. Depth and aquifer zone tapped in the piezometer shall be commensurate with that of pumping well/ wells.
- iii) In addition, the proponent shall monitor ground water levels by establishing observation wells (piezometers) in the core and buffer zones as specified in the No Objection Certificate.
- iv) In case of coal and other base metal mining the project proponent shall use the advance dewatering technology (by construction of series of dewatering abstraction structures) to avoid contamination of surface water.
- v) In addition to this, all mining units shall also monitor the water quality of mine seepage and mine discharge through NABL accredited/ Govt. approved laboratories and the same shall be submitted at the time of self compliance.
- vi) All mining projects drawing ground water in safe, semi-critical and critical assessment units shall be required to pay ground water abstraction charges as applicable as per Tables 5.4 A.
- vii) All mining projects drawing ground water in over-exploited assessment units shall be liable to pay ground water restoration charges as per Table 5.4 B.

#### **Documents to be submitted with the application**

- (a) Mining plan approved by the concerned Govt. agency/ department.
- (b) Proposal for rain water harvesting/ recharge within the premises as per Model Building Bye Laws issued by Ministry of Housing & Urban Affairs.
- (c) Comprehensive report prepared by accredited consultant on ground water conditions in both core and buffer zones of the mine, depth wise and year wise mine seepage calculations, impact assessment of mining and dewatering on ground water regime and its socio-economic impact, details of recycling, reuse and recharge, reduction of pumping with use of technology for mining and water management to minimize and mitigate the adverse impact on ground water, based on local conditions. Format for report is given in **Annexure V**.

#### **4.3 Infrastructure projects:**

Since infrastructure projects are location specific, grant of No Objection Certificate to such projects located in over-exploited assessment units shall not be banned. New infrastructure projects/ residential buildings may require dewatering during construction activity and/ or use ground water for construction. In both cases, applicants shall seek No Objection Certificate from CGWA before commencement of work. However, in over-exploited assessment units, use of ground water for construction activity shall be permitted only if no treated sewage water is available within 10 km radius of the site. New as well as existing Infrastructure projects shall also be required to seek No Objection Certificate for abstraction of ground water.

No 'No Objection Certificate' shall be granted for extraction of groundwater for Water Parks, Theme Parks and Amusement Parks in over-exploited assessment units.

Indicative list of Infrastructure projects is given in Annexure VI.

The No Objection Certificate for ground water abstraction will be granted subject to the following specific conditions:

- i) In case of infrastructure projects that require dewatering, proponent shall be required to carry out regular monitoring of dewatering discharge rate (using a digital water flow meter) and submit the data through the web portal to CGWA/SGWA as applicable. Monitoring records and results should be retained by the proponent for two years, for inspection or reporting as required by CGWA/SGWA.

- ii) Installation of Sewage Treatment Plants (STP) shall be mandatory for new projects, where ground water requirement is more than 20 m<sup>3</sup>/day. The water from STP shall be utilized for toilet flushing, car washing, gardening etc.
- iii) For infrastructure dewatering/ construction activity, No Objection Certificate shall be valid for specific period as per the detailed proposal submitted by the project proponent.
- iv) All infrastructure projects drawing ground water in safe, semi-critical and critical assessment units shall be required to pay ground water abstraction charges as applicable as per Table 5.3 A.
- v) All infrastructure projects (new/ existing) drawing ground water in over-exploited assessment units shall be liable to pay ground water restoration charges as per Table 5.3 B.

#### **Documents to be submitted with the application**

- (a) In cases where dewatering is involved, submission of impact assessment report prepared by an accredited consultant on the ground water situation in the area giving detailed plan of pumping, proposed usage of pumped water and comprehensive impact assessment of the same on the ground water regime shall be mandatory. The report should highlight environmental risks and proposed management strategies to overcome any significant environmental issues such as ground water level decline, land subsidence etc.
- (b) An affidavit on non judicial stamp paper of Rs. 10/- regarding non availability of water from any other source in case water is required for construction in safe and semi critical areas.
- (c) Certificate from a government agency regarding non availability of treated sewage water for construction within 10 km radius of the site in critical and over-exploited areas.
- (d) Certificate of non-availability of water from local government water supply agency in respect of all categories of assessments units for commercial use.
- (e) Proposal for rain water harvesting/ recharge within the premises as per Model Building Bye Laws issued by Ministry of Housing & Urban Affairs.
- (f) Details of water requirement computed as per National Building Code, 2016 (**Annexure I**), taking into account recycling/ reuse of treated water for flushing etc. (in case of completed infrastructure projects for commercial use).
- (g) Completion certificate from the concerned agency for infrastructure projects requiring water for commercial use.

#### **5.0 Ground water abstraction/ restoration charges**

All residential apartments/ group housing societies/ Government water supply agencies in urban areas shall be required to pay ground water abstraction charges.

All industries/mining/ infrastructure projects drawing ground water in safe, semi-critical and critical assessment units will have to pay ground water abstraction charges based on quantum of ground water extraction and category of assessment unit as per details given in this guideline.

All existing mining/ infrastructure projects and existing industries including MSME drawing ground water in over-exploited assessment units will have to pay ground water restoration charges based on quantum of ground water extraction. Further, new MSME, new infrastructure and new Mining projects in over exploited areas shall also be required to pay ground water restoration charges.

Existing industries, infrastructure units and mining projects which have installed/constructed artificial recharge structures in compliance of the conditions prescribed in the groundwater guidelines prevailing at the time of grant of No Objection Certificate or its renewal shall be eligible for a rebate of 50% (fifty percent) in the ground water abstraction charges/ground water restoration charges, subject to their satisfactory performance and verification.

The revenue generated from the proposed water abstraction/ restoration charges shall be kept in a separate fund for implementation of site specific suitable demand/ supply side interventions.

### 5.1 Rates of Ground water abstraction /restoration charges

#### I. Drinking and domestic use for residential apartments/ group housing societies/ Government water supply agencies in Urban areas

All residential apartments/ Group Housing Societies requiring water only for drinking/domestic use requiring No Objection Certificate would pay ground water abstraction charges as per rates given below in Table 5.1.

**Table 5.1 Ground Water Abstraction charges for Drinking & Domestic use.**

Quantum of Groundwater withdrawal (m <sup>3</sup> /month)	Rate of ground water abstraction charges (Rs. per m <sup>3</sup> )
0-25	No charge
26-50	1.00
>50	2.00

Government water supply agencies and Government infrastructure projects shall pay Ground water abstraction Charges @ Rs. 0.50 per m<sup>3</sup>.

#### II. Packaged Drinking Water units

Rates of ground water abstraction charges for packaged drinking water units in safe, semi-critical and critical assessment units are given in Table 5.2 A and those for ground water restoration charges in over-exploited assessment units are given in Table 5.2 B.

**Table 5.2 A: Rates of ground water abstraction charges for packaged drinking water units (Rs per m<sup>3</sup>)**

S.No.	Category of area ↓ Ground water use →	Quantum of ground water withdrawal				
		Up to 50m <sup>3</sup> /day	51 to <200 m <sup>3</sup> /day	200 to <1000 m <sup>3</sup> /day	1000 to <5000 m <sup>3</sup> /day	5000 m <sup>3</sup> /day and above
1.	Safe	1.00	3.00	5.00	8.00	10.00
2.	Semi-critical	2.00	5.00	10.00	15.00	20.00
3.	Critical	4.00	10.00	20.00	40.00	60.00

**Table 5.2 B: Rates of ground water restoration charges for packaged drinking water units (Rs per m<sup>3</sup>)**

S.No.	Category of area ↓ Ground water use →	Quantum of ground water withdrawal				
		Up to 50 m <sup>3</sup> /day	51 to <200 m <sup>3</sup> /day	200 to <1000 m <sup>3</sup> /day	1000 to <5000 m <sup>3</sup> /day	5000 m <sup>3</sup> /day and above
1.	Over-exploited (existing industries only)	8.00	20.00	40.00	80.00	120.00

### III. Other Industries & infrastructure projects

Rates of ground water abstraction charges for other industries and infrastructure projects in safe, semi-critical and critical assessment units are given in Table 5.3 A and those for ground water restoration charges in over-exploited assessment units are given in Table 5.3 B.

**Table 5.3 A: Rates of Ground Water abstraction charges for other industries & infrastructure projects (Rs per m<sup>3</sup>)**

S.No.	Category of area ↓ Ground water use →	Quantum of ground water withdrawal			
		< 200 m <sup>3</sup> /day	200 to <1000 m <sup>3</sup> /day	1000 to <5000 m <sup>3</sup> /day	5000 m <sup>3</sup> /day and above
1.	Safe	1.00	2.00	3.00	5.00
2.	Semi-critical	2.00	3.00	5.00	8.00
3.	Critical	4.00	6.00	8.00	10.00

**Table 5.3 B: Rates of ground water restoration charges for other industries & infrastructure projects (Rs per m<sup>3</sup>)**

S.No.	Category of area ↓ Ground water use →	Quantum of ground water withdrawal			
		< 200 m <sup>3</sup> /day	200 to <1000 m <sup>3</sup> /day	1000 to <5000 m <sup>3</sup> /day	5000 m <sup>3</sup> /day and above
1.	Over-exploited (existing industries / new Industries as per the present Guidelines)	6.00	10.00	16.00	20.00

### IV. Mining projects

Rates of ground water abstraction charges for mining, which are drawing ground water in safe, semi-critical and critical assessment units are given in Table 5.4 A and those for ground water restoration charges in case of projects drawing ground water in over-exploited assessment units are given in Table 5.4 B.

**Table 5.4 A: Rates of ground water abstraction charges for mining (Rs. per m<sup>3</sup>)**

S.No.	Category of area ↓ Ground water use →	Quantum of ground water withdrawal			
		< 200 m <sup>3</sup> /day	200 to <1000 m <sup>3</sup> /day	1000 to <5000 m <sup>3</sup> /day	5000 m <sup>3</sup> /day and above
1.	Safe	1.00	2.00	2.50	3.00
2.	Semi-critical	2.00	2.50	3.00	4.00
3.	Critical	3.00	4.00	5.00	6.00

**Table 5.4 B: Rates of ground water restoration charges for mining (Rs. per m<sup>3</sup>)**

S.No.	Category of area ↓  Ground water use →	Quantum of ground water withdrawal			
		< 200 m <sup>3</sup> /day	200 to <1000 m <sup>3</sup> /day	1000 to <5000 m <sup>3</sup> /day	5000 m <sup>3</sup> /day and above
1.	Over-exploited	4.00	5.00	6.00	7.00

### 6.0 Bulk Water Supply

All private tankers abstracting ground water and use it for supply as bulk water suppliers will now mandatorily seek No Objection Certificate for ground water abstraction. The bulk water suppliers through tankers drawing ground water in safe, semi-critical and critical assessment units shall pay groundwater abstraction charges as per the **Table-6.1 A**. The bulk water suppliers drawing ground water in over-exploited assessment units shall pay the groundwater restoration charges as per the **Table-6.1 B**. All tankers will have to install GPS based system for their monitoring of movement/area of operation.

Modalities for issue of No Objection Certificate for bulk/tanker water supplies shall be worked out in consultation with States/Uts and suitable guidelines in this regard will be framed and issued separately for the same.

**Table-6.1A: Groundwater abstraction charges for Bulk/Tanker water supplies**

Category	Rate per m <sup>3</sup> (in Rs.)
Safe	<b>10</b>
Semi Critical	<b>20</b>
Critical	<b>25</b>

**Table-6.1B: Groundwater abstraction charges for Bulk/Tanker water supplies**

Category	Rate per m <sup>3</sup> (in Rs.)
Over Exploited	<b>35</b>

### 7.0 Abstraction of Saline ground water

Abstraction of saline ground water in areas having either saline ground water at all depths or pockets of saline ground water in an otherwise fresh water area for use by industries/ dewatering by infrastructure/ mining projects including those located in over-exploited areas would be encouraged. Such industries shall be exempted from paying ground water abstraction charges.

The list of such assessment units having saline ground water at all depths as per the latest assessment of dynamic ground water resources will be made available by the CGWA in their website. However, due care shall be taken in respect of disposal of effluents by the units so as to protect the water bodies and the aquifers from pollution.

Detailed guidelines in this regard shall be prepared and issued separately.

### 8.0 Protection of Wetland Areas

The wet land areas in the country are very crucial as they are direct reflection of the presence of ground water in such areas. The protection of the wetland areas is being separately handled by the Wetland Authorities. Since ground water is very crucial for the survival of the wetland area, any excessive ground water development within the zone of wetland area would affect the volume of water in that wetland.

Projects falling within 500 m. from the periphery of demarcated wetland areas shall mandatorily submit a detailed proposal indicating that any ground water abstraction by the project proponent does not affect the protected wetland areas. Furthermore, before seeking permission from CGWA, the projects shall take consent/approval from the appropriate Wetland Authorities to establish their projects in the area.

### 9.0 General compliance conditions in No Objection Certificate

- i. Installation of digital water flow meter (conforming to BIS/ IS standards) having telemetry system in the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate through the web-portal.
- ii. Proponents shall mandatorily get water flow meter calibrated on from an authorized agency once in a year.
- iii. Proponents shall install roof top rain water harvesting & recharge systems in the project area.
- iv. Proponents shall pay Ground Water Abstraction/ Restoration Charges based on quantum of ground water extraction as applicable as per the rates given in Section 6.
- v. Construction of purpose-built observation wells (piezometers) for ground water level monitoring shall be mandatory as per Section 15. Water level data shall be made available to CGWA through web portal. Detailed guidelines for construction of piezometers are given in **Annexure-II**.
- vi. Proponents shall monitor quality of ground water from the abstraction structure(s) once in a year. Water samples from bore wells/ tube wells / dug wells shall be collected during April/May every year and analysed in NABL accredited laboratories for basic parameters (cations and anions), heavy metals, pesticides/ organic compounds etc. Water quality data shall be made available to CGWA through the web portal.
- vii. If the existing well becomes defunct due to mechanical failure within the validity period of No Objection Certificate, the user can construct a replacement well under intimation to CGWA on web portal. The defunct well shall be properly sealed (**Refer Annexure VII**). The user will be required to submit documentary proof in this regard. However, if the existing abstraction structures fails to yield water and he proponent desires to drill another tubewell in the same premises, prior permission of the Authority shall be required. If the replacement well is to be drilled in some different place, the proponent shall obtain fresh No Objection Certificate.
- viii. Wherever feasible, requirement of water for greenbelt (horticulture) shall be met from recycled / treated waste water.
- ix. In case of change of ownership, new owner of the industry will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.

### 10.0 Monitoring of compliance of No Objection Certificate Conditions

To monitor the compliance of No Objection Certificate conditions, Central Ground Water Authority and State/ UT Ground Water Authorities shall take the following steps:

- a. Suitable MIS will be developed for compliance monitoring.
- b. District Collectors/Deputy Commissioners (DCs) /District Magistrates (DMs) are authorized to take enforcement measures like sealing of unauthorized ground water abstraction structures, disconnection of electricity, launching of prosecution against those violating the No Objection Certificate conditions and taking action for imposition of Environmental Compensation.
- c. Technical officers of CGWB/ CGWA and State groundwater organizations are authorized to take actions with respect to monitoring and periodic inspections with the approval of competent authority.
- d. In case of violation of any of the No Objection Certificate conditions, the proponents shall be liable to pay the penalties as per **Section 16**.

### 11.0 Renewal of No Objection Certificate

No objection certificate shall be renewed periodically, subject to the compliance of the conditions mentioned therein:

- i. The applicant shall apply for renewal of No Objection Certificate at least ninety days prior to expiry of its validity.
- ii. Application for renewal of No Objection Certificate shall be accompanied by the Compliance Report.
- iii. Before granting renewal, Central Ground Water Authority or State/ Ut Authority shall satisfy itself that the conditions of No Objection Certificate have been complied with.
- iv. In case of change in category of the assessment unit, renewals would be granted with conditions as laid down for new category.
- v. No Objection Certificate will be renewed for the terms specified for various uses as follows:

Category	Use	Term of renewal
Critical, Semi-critical and safe	Infrastructure projects for drinking & domestic use and urban Water Supply Agencies	5 years
	Industries	3 years
	Mines	2 years
Over exploited	All users in 'Over-exploited areas'	2 years

- vi. If the application for renewal is submitted in time and the CGWA/ the respective State/ Ut Authority is unable to process the application in time, No Objection Certificate shall be deemed to be extended till the date of renewal of No Objection Certificate.
- vii. If the proponent fails to apply for renewal within 3 months from the date of expiry of No Objection Certificate, the proponent shall be liable to pay Environmental Compensation for the period starting from the date of expiry of No Objection Certificate till No Objection Certificate is renewed by the competent authority.

### 12.0 Extension of No Objection Certificate

If the proponent is unable to construct the well(s) during the validity period of No Objection Certificate for genuine reasons, the proponent will have to apply for extension of No Objection Certificate. Application for extension should be supported by documents justifying the reasons for delay. Other conditions for grant of extension of No Objection Certificate will be the same as that for fresh No Objection Certificate.

Extension of No Objection Certificate will be granted for a maximum period of two years. No further extension will be granted after the expiry of the extended period. In that case, the applicant will have to apply afresh for grant of No Objection Certificate.

### 13.0 Delegation of powers against illegal groundwater withdrawal

Central Ground Water Authority has appointed the District Magistrate/ District Collector/ Sub Divisional Magistrates of each Revenue District/Sub division as Authorized Officers, who have been delegated the power to seal illegal wells, disconnect electricity supply to the energised well, launch prosecution against offenders etc. including grievance redressal related to ground water in their respective jurisdictions.

In order to further decentralise and strengthen the monitoring and compliance mechanism as per the guidelines, officials of concerned Departments of Revenue and Industries of the States/Uts shall be appointed as Authorised Officers in consultation with the State/Ut Governments.

A copy of the No Objection Certificate issued by the CGWA in the No Objection Certificate Application Portal (NOCAP) will be forwarded to the respective District Magistrate/ District Collector. In case of any violation of the directions of Central Ground Water Authority and non-fulfilment of the conditions laid

down in the No Objection Certificate, the Authorised Officers will file appropriate Petition/Original Application etc under sections 15 to 21 of the Environment (Protection) Act, 1986 in appropriate Courts.

#### 14.0 Ground Water Level Monitoring

All the project proponents (drawing ground water more than 10 cum/d) have to mandatorily construct Piezometers (observation wells) within their premises for monitoring of the ground water levels. Such a mechanism of compliance conditions has been made to ensure that every month the ground water level in the project area can be monitored and observed. In this regard the necessary criteria for monitoring of water levels through piezometers by the project proponents is given in Table 14.1.

**Table 14.1 No. of Piezometers to be constructed & Type of Water Level Monitoring Mechanism**

S.No.	Quantum of Ground water withdrawal (cum/d)	No. of piezometer required	Monitoring mechanism		
			Manual	DWLR	DWLR with Telemetry
1	<10	0	0	0	0
2	11-50	1	1	0	0
3	51-500	1	0	1	0
4	>500	2	0	1	1

The piezometer shall be suitably located to ensure that zone of aquifer tapped in the piezometer is the same as that of the pumping well.

#### 15.0 Environmental Compensation

Extraction of ground water for commercial use by industries, infrastructure units and mining projects without a valid No Objection Certificate from appropriate authority shall be considered illegal and such entities shall be liable to pay Environmental Compensation for the quantum of ground water so extracted. The norms prescribed by Central Pollution Control Board (CPCB) shall be utilized for calculating the Environmental compensation as mentioned below:

$$EC_{GW} = \text{Ground water consumption per day} \times \text{Environmental Compensation rate (ECR}_{GW}) \times \text{No. of days} \times \text{Deterrence factor}$$

where ground water consumption is in m<sup>3</sup>/day and ECR<sub>GW</sub> in Rs./ cum

##### 15.1 Rates of Environmental Compensation:

Rates of Environmental Compensation (ECR<sub>GW</sub>) for various types of users in different categories of assessment units are given in Table 15.1 to 15.3.

**Table 15.1 : ECR<sub>GW</sub> for Packaged Drinking Water units**

S.No.	Area Category	Water Consumption (cum/day)			
		<200/	200 to <1000	1000 to <5000	5000 & above
		Environmental Compensation Rate (ECR <sub>GW</sub> ) in Rs./m <sup>3</sup>			
	Safe	12	18	24	30
2	Semi critical	24	36	48	60
3	Critical	36	48	66	90
4	Over- exploited	48	72	96	120

**Note :-**Minimum EC<sub>GW</sub> shall not be less than Rs 1,00,000/-

**Table 15.2: ECR<sub>GW</sub> for Mining/ infrastructure dewatering projects**

S.No.	Area Category	Water Consumption (cum/day)			
		<200	200 to <1000	1000 to <5000	5000 & above
		Environmental Compensation Rate (ECR <sub>GW</sub> ) in Rs./m <sup>3</sup>			
1	Safe	15	21	30	40
2	Semi critical	30	45	60	75
3	Critical	45	60	85	115
4	Over- exploited	60	90	120	150

**Note :-**Minimum ECR<sub>GW</sub> shall not be less than Rs 1,00,000/-

**Table 15.3: ECR<sub>GW</sub> for Industrial units**

S.No.	Area Category	Water Consumption (cum/day)			
		<200	200 to <1000	1000 to <5000	5000 & above
		Environmental Compensation Rate (ECR <sub>GW</sub> ) in Rs./m <sup>3</sup>			
1	Safe	20	30	40	50
2	Semi critical	40	60	80	100
3	Critical	60	80	110	150
4	Over- exploited	80	120	160	200

**Note :-**Minimum ECR<sub>GW</sub> shall not be less than Rs 1,00,000/-

### 15.2 Deterrent Factors to compensate losses and environmental damage (for packaged drinking water units, mining, industries and infrastructural dewatering projects)

The following deterrent factors based on the duration of illegal ground water extraction shall be levied to compensate for the losses and environmental damages as detailed in Table 15.4.

**Table 15.4: Deterrent factor based on quantum of ground water withdrawal and number of years of illegal withdrawal**

S.No.	Water Consumption	Deterrence Factor		
		< 2 years	2-5 years	>5 years
1	<1000 KLD	1.00	1.00	1.25
2	1000-5000 KLD	1.00	1.00	1.50
3	>5000 KLD	1.00	1.25	2.00

**Note:** KLD – Kilolitre per day

### 16.0 Provision of Penalty

Penalty shall be imposed on the proponents for non-compliance of No Objection Certificate conditions issued by the appropriate authority. Rates of penalty proposed for non-compliance of various conditions of No Objection Certificate are given in Table 16.1. The rates of the penalty shall be reviewed periodically with the approval of competent authority in Ministry of Jal Shakti.

**Table 16.1: Penalty provision for non Compliance of No Objection Certificate conditions**

S. No.	Items	Charges in Rs.
1	Non installation/faulty Digital water Flow meter with telemetry system.	200000
2	Non disclosure/ construction of additional groundwater abstraction structures a) Non-functional Structures. b) Defunct/Abandoned Note: Given rates are for unit non-functional/defunct/abandoned structures. This shall be multiplied with total such structures to arrive at consolidated penalty.	200000 100000
3	Reporting of fresh water zones as Brackish / Saline zones in application.	200000
4	Non Installation of Piezometer.	200000
5	Non Installation/faulty DWLR/Telemetry system	100000
6	Non Construction/Inadequate capacity of Recharge / Water conservation structures.	500000
7	Non maintenance of Recharge structures.	200000
8	Injection of treated/untreated water into the aquifer system. Note: In addition to penalty, the proponent shall bear the cost of aquifer remediation as per the provisions of Environment (Protection) Act, 1986.	1000000
9	Non Submission of Water level/Water quality Data.	50000
10	Non-maintenance of log book of daily withdrawal/non submission of Groundwater abstraction data.	50000
11	Non submission of photograph of recharge structure(s).	50000
12	Non Submission of Self Compliance report.	100000
13	Construction of groundwater abstraction structures by un authorized/unregistered Drilling Rigs (per structures).	100000
14	Non registration of water supply tankers.	500000
15	Submission of false information/ undertaking.	100000

Charges shall also be payable for correction/modification in the existing issued No Objection Certificate letter. The details of such charges are given in [Table 16.2](#).

**Table 16.2: Proposed Charges for correction/Modification in the existing issued No Objection Certificate**

S. No.	Items	Charges in Rs.
1	Change in recharge quantum	10000
2	Change in User ID.	5000
3	Change in firm Name	5000
4	Extension of No Objection Certificate	5000
5	Issuance of duplicate No Objection Certificate	5000
6	Issuance of corrigendum to No Objection Certificate	5000
7	Any other items/corrections etc	5000

**17.0 Other important Conditions (Applicable to all):**

- i. Sale of ground water by a person/ agency not having valid no objection certificate from CGWA/State Ground Water Authority is not permitted.
- ii. In infrastructure projects, paved/parking area must be covered with interlocking/perforated tiles or other suitable measures to ensure groundwater infiltration/harvesting.
- iii. In case of Infrastructure projects, the firm/entity shall ensure implementation of dual water supply system in the projects. Compliance of the same shall be submitted through the web portal.
- iv. Non-compliance of conditions mentioned in the No Objection Certificate may be taken as sufficient reason for cancellation of no objection certificate accorded/ non-renewal of No Objection Certificate.
- v. No application shall be entertained without supporting documents as specified in relevant sections.
- vi. Abstraction structure(s) should be located inside the premises of project property.
- vii. Self compliance of conditions laid down in the no objection certificate shall be reported by the users online in the web portal of Central Ground Water Authority/state Ground Water Authority.
- viii. Processing fee prescribed, if any, from time to time shall be charged for various services.

**Note:**

1. Guidelines are subject to modification from time to time.
2. In case of any discrepancy between Hindi and English versions of this document including the annexures, the English version shall prevail.

**Annexure I****Estimation of Water Requirements for drinking and domestic use****(Source: National Building Code 2016, BIS)**

## a) Residential Buildings:

Accommodations	Population
1 Bedroom dwelling unit	4
2 Bedroom dwelling unit	5
3 Bedroom dwelling unit	6
4 Bedroom dwelling unit and above	7

**Notes:**

- 1) The above figures consider a domestic household including support personnel, wherever applicable.
- 2) For plotted development, the population may be arrived at after due consideration of the expected number and type of domestic household units.
- 3) Dwelling unit under EWS category shall have population requirement of 4 and studio apartment shall have population requirement of 2.

As a general rule the following rates per capita per day may be considered for domestic and non-domestic needs:

## a) For communities with populations up to 20,000:

1)	Water supply through stand post:	40 lphd (Min)
2)	Water supply through house service: connection	70 to 100 lphd

- b) For communities with: 100 to 135 lphd  
population 20,000 to 100,00 together with  
full flushing system
- c) For communities with population: 150 to 200 lphd  
above 100,000 together with  
full flushing system

**Note**—The value of water supply given as 150 to 200 litre per head per day may be reduced to 135 litre per head per day for houses for Medium Income Group (MIG) and Low Income Groups (LIG) and Economically Weaker Section of Society (EWS), depending upon prevailing conditions and availability of water.

Out of the 150 to 200 litre per head per day, 45 litre per head per day may be taken for flushing requirements and the remaining quantity for other domestic purposes.

**A. Water Requirements for Buildings Other than Residences**

Sl No.	Type of Building	Domestic litres per head/ day	Flushing Litres per head/ day	Total Consumption Litres per head/ day
1.	Factories including canteen where bath rooms are required to be provided	30	15	45
2.	Factories including canteen where no bath rooms are required to be provided	20	10	30
3.	Hospital (excluding laundry and kitchen):			
	a) Number of beds not exceeding 100	230	110	340
	b) Number of beds exceeding 100	300	150	450
	c) Out Patient Department (OPD)	10	5	15
4.	Nurses' homes and medical quarters	90	45	135
5.	Hostels	90	45	135
6.	Hotels (up to 3 star) excluding laundry, kitchen, staff and water bodies	120	60	180
7.	Hotels (4 star and above) excluding laundry, kitchen, staff and water bodies	260	60	320
8.	Offices (including canteen)	25	20	45
9.	Restaurants and food court including water requirement for kitchen:			
	a) Restaurants	55 per seat	15 per seat	70 per seat
	b) Food Court	25 per seat	10 per seat	35 per seat
10.	Clubhouse	25	20	45
11.	Stadiums	4	6	10

12.	Cinemas, concert halls and theatres and multiplex	5 per seat	10 per seat	15 per seat
13.	Schools/Educational institutions:			
	a) Without boarding facilities	25	20	45
	b) With boarding facilities	90	45	135
14.	Shopping and retail (mall)			
	a) Staff	25	20	45
	b) Visitors	5	10	15
15.	Traffic Terminal stations			
	a) Airports	40	30	70
	b) Railway stations (Junction) with bathing facility	40	30	70
	c) Railway stations (Junction) without bathing facility	30	15	45
	d) Railway stations (Intermediate) with bathing facility	25	20	45
	e) Railway stations (Intermediate) without bathing facility	15	10	25
	f) Interstate bus terminals	25	20	45
	g) Intrastate Bus Terminals/Metro Stations	10	5	15

**Notes:**

1. For calculating water demand for visitors, consumption of 15 litre per head per day may be taken.
2. The water demand includes requirement of patients, attendants, visitors and staff. Additional water demand for kitchen, laundry and clinical water shall be computed as per actual requirements.
3. The number of persons shall be determined by average number of passengers handled by stations, with due considerations given to the staff and vendors who are using these facilities.
4. Consideration should be given for seasonal average peak requirements.
5. The hospitals may be categorized as Category A (25 to 50 beds), Category B(51 to 100 beds), Category C (101 to 300 beds), Category D (301 to 500) and Category E (501 to 750 beds).

**Annexure II****Guidelines for construction of Piezometers and monitoring of Ground Water Levels and Quality**

Piezometer is a borewell/tubewell used only for measuring the water level by lowering a tape/sounder or automatic / digital water level measuring equipment. It is also used to take water sample for water quality testing whenever needed. General guidelines for installation of piezometers are as follows:

- The piezometer is to be installed/constructed at the minimum distance of 50 m from the pumping well through which ground water is being withdrawn. The diameter of the piezometer should be about four inches to six inches.
- The depth of the piezometer should be the same as that of the pumping well from which ground water is being abstracted. If, more than one pumping wells are constructed tapping aquifers at different depths, more than one piezometers shall be required to be constructed tapping different aquifers as in the pumping wells.

- The measurement of water level in piezometer should be taken, only after the pumping from the surrounding tubewells has been stopped for about four to six hours.
- The ground water quality has to be monitored once in a year during pre-monsoon (April/ May) period by industries and mines drawing ground water. Samples of ground water should be analyzed from NABL accredited laboratory.
- A permanent display board should be installed at Piezometer/ Tubewell site for providing the location, piezometer/ tubewell number, depth and zone tapped of piezometer/tubewell for standard referencing and identification.
- Any other site specific requirement regarding safety and access for measurement may be taken care off.

### Annexure III

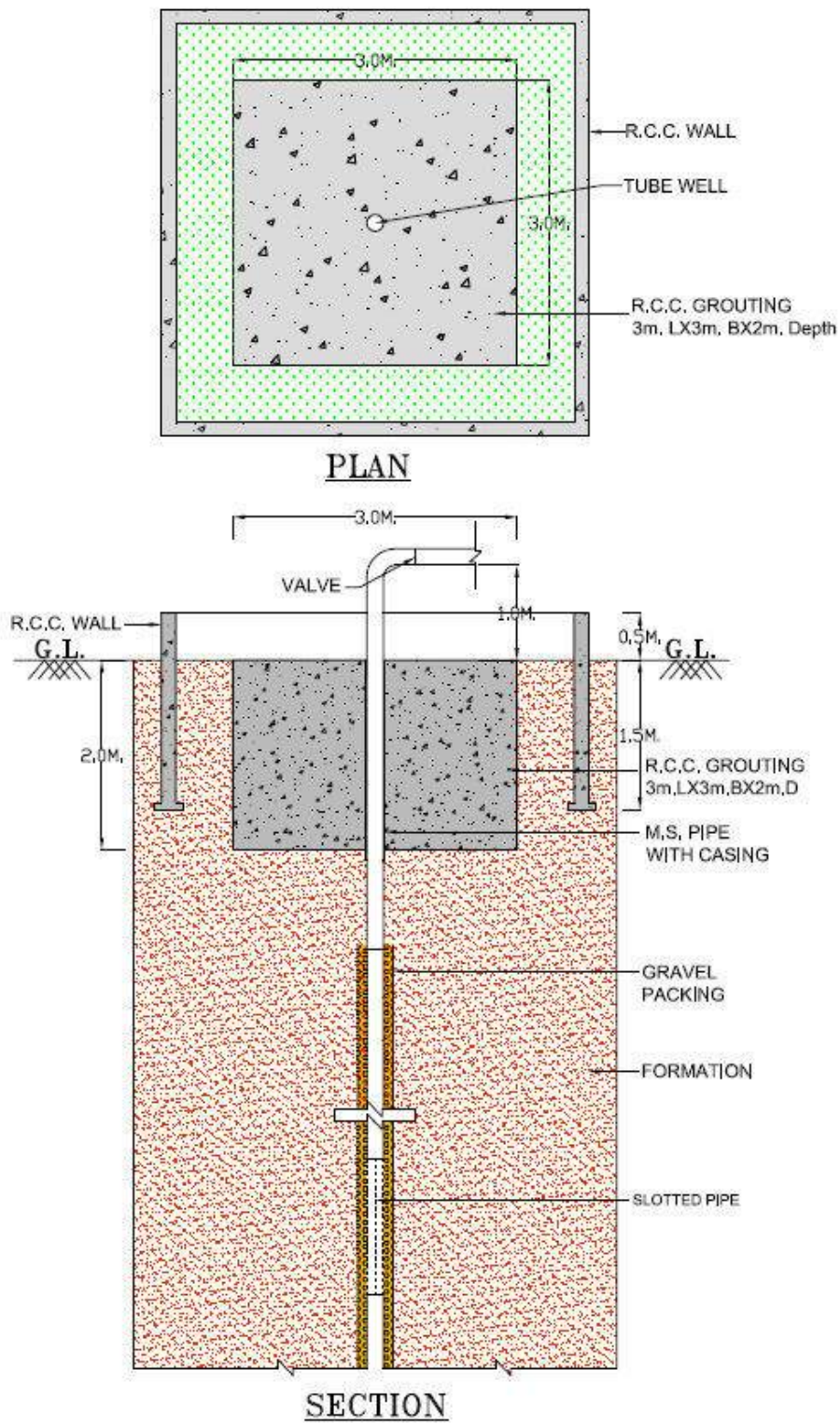
#### **Measures to be adopted to ensure prevention from pollution in the plant premises of polluting industries/ projects**

It has been observed that ground water in and around polluting industries like Tannery, Slaughter Houses, Dye, Chemical, Coalwashery, other hazardous units, etc., is polluted. In order to prevent further deterioration of ground water quality, it is essential to take all necessary measures for well head protection. All industries/ projects falling under this category are hereby directed to follow the under mentioned procedure both for existing and new category.

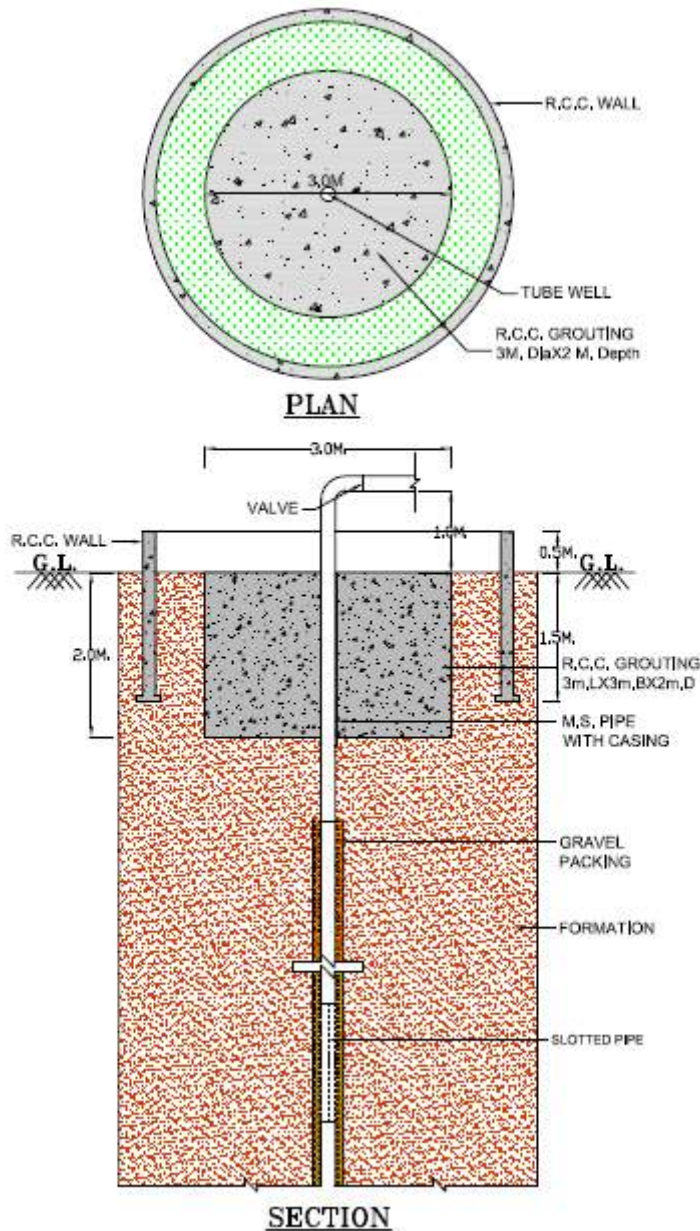
1. No tube well/ bore well / dug well should be constructed in the vicinity of the processing unit. Tube well/ bore well should be constructed at the place which is hygienically maintained.
2. Only Mild Steel pipe should be used for assembly/ casing and PVC (Poly Vinyl Chloride) or similar pipes should not be used. The tube well/ bore well having PVC or similar pipes should be abandoned and filled back.
3. Around the tube well/ bore well, RCC (Reinforced Concrete Cement) grouting of 3 meters (length) x 3 meters (width) x 2 meters (depth) must be provided. The pipe of the tube well/ bore well must be raised 1 meter above ground level (1 magl). The tube well/ bore well must be surrounded by RCC wall of 0.5 meter height and 1.5 meter depth to prevent any surface contamination to enter the constructed tube well/ bore well. Plan/Sectional diagram is enclosed for reference (Appendix 1 and 2).
3. The tube well/ bore well must be fitted with NRV (Non Return Valve) in order to ensure that the constructed tube well/ bore well is exclusively used for abstraction of ground water only.
4. At no point of time there should be any injection of any water or fluid into the constructed tube well/ bore well/ Piezometer.
5. The industries/ projects under this category should not implement any recharge measures within the plant premises.
6. Any tube well/ bore well located/ constructed in the vicinity of STP (Sewage Treatment Plant) or ETP (Effluent Treatment Plant) should be abandoned and filled back.
7. The piezometer to be constructed for monitoring purpose should follow the same procedure as that for tube well/ bore well for such industries/ projects.

Appendix 1

Plan/ Sectional diagram showing well head protection



Plan/ Sectional diagram showing well head protection

**Annexure-IV****Outline of hydro-geological Report for obtaining No Objection Certificate for industries**

1. Brief about the proposed project giving location details, coordinates, google/ toposheet maps, etc. demarcating the project area.
2. Ground water situation in and around the project area including water level and quality data and maps along with quality issues, if any. In case of mines, ground water conditions in both core and buffer zone should be described.
3. Details of the tubewells/ borewells proposed to be constructed. This includes the drilling depth, diameter, tentative lithological log, details of pump to be lowered, H.P. of pump, tentative discharge of tubewells/ borewells, etc. Locations to be marked on the site plan/ map. Location of proposed piezometers.

4. Details of Geophysical studies carried out in and around the project area. Ground water resources computation of the block in which the project falls.
5. Approved Mine plan in case of mines and detailed dewatering plan in case of mine/ infrastructure dewatering projects.
6. Proposed usage of pumped water in case of mining/ infrastructure dewatering projects.
7. Comprehensive assessment of the impact on the ground water regime in and around the project area highlighting the risks and proposed management strategies proposed to overcome any significant environmental issues.
8. Proposed measures for disposal of waste water by industries drawing saline water.
9. Measures to be adopted for water conservation which include recycling, reuse, treatment, etc. This includes the water balance chart being adopted by the firm along with details of water conservation methods to be adopted.
  - Brief write up along with capacity and flow chart of Sewage Treatment Plants / Effluent Treatment Plants / Combined Effluent Treatment Plants existing/ proposed within the project.
  - Details of water conservation measures to be adopted to reduce/ save the ground water.
  - Total water balance chart showing the usage of water for various processes.
10. Any other details pertaining to the project.

## Annexure V

### **Format of the Report on ground water conditions (for mining projects)**

Introduction

Project description

Background

Objectives and scope

Regional setting

Location

Landuse

Climate

Topography and drainage

Geology –Regional and Local

General Hydrogeology (aquifer types, aquifer depth, zone tapped etc.)

Groundwater condition (In core and buffer zones)

Spatial and temporal variations in water levels Groundwater quality (Shallow and deep aquifer)

Impact of groundwater extraction on local groundwater

Hydrograph of water level/piezometer in monitoring wells

Trend analysis of historical water levels Flow net analysis (groundwater flow direction)

Year wise/ bench wise mine dewatering computation as per approved mine plan

Conclusions

## Annexure VI

**Indicative list of Infrastructure projects**

Residential townships including commercial buildings
Office building
School
College
University
Special Economic Zone
Metro Station
Railway Station
Bus Depot
Airport
Seaport
Highway infrastructure
Fire station
Warehouse
Business Plaza
Malls & Multiplex
Hospitals
Nursing Homes
Resort
Hotel/ Restaurant/ Food Plaza
Holiday home/Guest house/ Hostels
Banquet Hall/ Marriage Gardens
IT Complex
Logistics & Cargo
Clubs
Trade Centre

## Annexure -VII

**Supreme Court Order in Civil Writ petition 36 of 2009 regarding measures for prevention of fatal accidents of small children due to their falling into abandoned bore wells and tube wells**

In Re: Measures for prevention of fatal accidents of small children due to their falling into abandoned bore wells and tube wells

Union of India and Ors.

Respondents(s)

**ORDER**

With this Court issuing requisite guidelines vide order dated 11th February, 2010, subject to slight modifications, nothing survives in the present writ petition.

That modification is as follows:

- (i) The owner of the land/ premises, before taking any steps for constructing bore well/ tube well must inform in writing to the concerned authorities in the area, i.e., District Collector/ District Magistrate/ Sarpanch of the Gram Panchayat/ any other Statutory Authority/ concerned officers of the Department of Ground Water/ Public Health/ Municipal Corporation, as the case may be, about the construction of bore well/ tube well.
- (ii) Registration of all the drilling agencies, namely, Government/ Semi Government, Private etc. should be mandatory with the district administration/ Statutory Authority wherever applicable.
- (iii) Erection of signboard at the time of construction near the well with the following details:-
  - (a) Complete address of the drilling agency at the time of construction/ rehabilitation of well.
  - (b) Complete address of the user agency/owner of the well.
- (iv) Erection of barbed wire fencing or any other suitable barrier around the well during construction.
- (v) Construction of cement/ concrete platform measuring 0.50x0.50x0.60 meter (0.30 meter above ground level and 0.30 meter below ground level) around the well casing.
- (vi) Capping of well assembly by welding steel plate or by providing a strong cap to be fixed to the casing pipe with bolts & nuts.
- (vii) In case of pump repair, the tube well should not be left uncovered.
- (viii) Filling of mud pits and channels after completion of works.
- (ix) Filling up abandoned bore wells by clay/sand/boulders/pebbles/drill cuttings etc. from bottom to ground level.
- (x) On completion of the drilling operations at a particular location, the ground conditions are to be restored as before the start of drilling.
- (xi) District Collector should be empowered to verify that the above guidelines are being followed and proper monitoring check about the status of bore holes/ tube wells are being taken care through the concerned state/ Central Government agencies.
- (xii) District/ Block/ Village wise status of bore wells/tube wells drilled viz. No. of wells in use, No. of abandoned bore wells/ tube wells found open, No. of abandoned bore wells/ tube wells properly filled up to ground level and balance number of abandoned bore wells/ tube wells to be filled up to ground level is to be maintained at District Level.

In rural areas, the monitoring of the above is to be done through Village Sarpanch and the Executive from the Agriculture Department.

In case of urban areas, the monitoring of the above is to be done through Junior Engineer and the Executive from the concerned Department of Ground Water/Public Health/ Municipal Corporation etc.

- (xiii) If a bore well/ tube well is 'Abandoned' at any stage, a certificate from the concerned department of Ground Water/ Public Health/ Municipal Corporation/ Private Contractor etc. must be obtained by the aforesaid agencies that the 'Abandoned' bore well/tube well is properly filled upto the ground level. Random inspection of the abandoned wells is also to be done by the Executive of the concerned agency/ department. Information on all such data on the above are to be maintained in the District Collector/ Block Development Office of the State.

We are informed that the last paragraph of the earlier order dated 11th February, 2010, concerning publicity has been duly complied with.

Subject to the above, the writ petition is disposed of.

.....CJL.  
[S.H. KAPADIA]

.....J.  
[K.S. RADHAKRISHNANA]

.....J.  
[SWATANTER KUMAR]

New Delhi,  
August 6, 2010

### **ANNEXURE VIII**

#### **List of States/Union territories where ground water extraction is being regulated by Central Ground Water Authority**

1. Andaman and Nicobar Islands
2. Assam
3. Arunachal Pradesh
4. Bihar
5. Chhattisgarh
6. Dadra and Nagar Haveli and Daman and Diu
7. Gujarat
8. Haryana
9. Jharkhand
10. Madhya Pradesh
11. Maharashtra
12. Manipur
13. Meghalaya
14. Mizoram
15. Nagaland
16. Odisha
17. Punjab
18. Rajasthan
19. Sikkim
20. Tripura
21. Uttar Pradesh
22. Uttarakhand
23. Andhra Pradesh (only mining projects)
24. Telangana (only mining projects)

**Glossary of technical terms used**

1. **Safe area:** Area categorized as SAFE from the ground water resources point of view, based on the latest ground water resources assessment carried out jointly by CGWB and State ground water organizations. Details available on the websites of NOCAP and CGWB.
2. **Semi-critical area:** Area categorized as SEMI-CRITICAL from the ground water resources point of view, based on the latest ground water resources assessment carried out jointly by CGWB and State ground water organizations. Details available on the websites of NOCAP and CGWB.
3. **Critical area:** Area categorized as CRITICAL from the ground water resources point of view, based on the latest ground water resources assessment carried out jointly by CGWB and State ground water organisations. Details available on the websites of NOCAP and CGWB.
4. **Over-exploited area:** Area categorized as OVER-EXPLOITED from the ground water resources point of view, based on the latest ground water resources assessment carried out jointly by CGWB and State ground water organisations. Details available on the websites of NOCAP and CGWB.
5. **Aquifer:** Geological formation capable of storing and transmitting ground water.
6. **Deeper Aquifer:** In areas having multiple aquifer system, the aquifer(s) occurring below the uppermost aquifer.
7. **Well:** Any structure used for the extraction of groundwater, including open wells, dug wells, bore wells, dug-cum-bore wells, tube wells, filter points, collector wells, infiltration galleries, recharge wells, or any of their combinations or variations.
8. **Government Agency:** May be Central or State Government body.
9. **Supplier:** Government/ Government approved Water Supply Agency.
10. **Mine:** Area where mining activity is taking place, or area abandoned after mining.
11. **Illegal Ground Water abstraction Structure:** Any energized abstraction structure viz. dugwell, tubewell, borewell which is being used to withdraw ground water without valid No Objection Certificate from Central Ground Water Authority.
12. **Rainwater Harvesting:** The technique or system of collection and storage of rainwater, at micro watershed scale, including roof-top harvesting, for future use or for recharge of groundwater.
13. **Mining Project:** Project which involves mining activity either open cast or underground or both.
14. **Ground Water Draft:** Quantum of ground water withdrawal.
15. **Saline Water:** Water having salinity in excess of 2500  $\mu$ siemens/cm at 25<sup>0</sup>C.
16. **Water Table Intersection:** Intersection of the water table on excavation of the overlying material due to mining or other activities.
17. **Drinking and domestic use:** Besides drinking & domestic use of households, this category will cover drinking requirement of industries not requiring water for industrial process; drinking, washing, cleaning use etc. in case of hospitals, hotels, malls & multiplexes, institutions, offices, banquet halls, fire stations, metro stations, railway stations, airports, sea ports, stadia etc.
18. **Recycle/Reuse:** Using treated waste water for various purposes/ putting water to multiple uses.
19. **Government Department:** Either Central Government or State Government.
20. **Municipality:** Municipality, a Municipal Corporation or similar body of local urban governance by any other name.
21. **Groundwater:** Water, which exists below the surface in the zone of saturation and can be extracted through wells or any other means or emerges as springs and base flows in streams and rivers;
22. **Bgl :** Below Ground Level.
23. **BCM :** Billion cubic metres.

24. **Groundwater Abstraction structure:** Structure used to withdraw groundwater like bore well / tube well / dug well/dug cum bore well/tunnel well.
25. **Observation well or Piezometer:** A bore well/tube well used only for measuring the water level/piezometric head and to take water sample periodically but not used for groundwater abstraction.
26. **Water Audit:** A method of quantifying water use in simple or complex systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use.
27. **Ground water pollution:** If concentration of any parameter in ground water exceeds the maximum permissible limit for drinking water prescribed by the Bureau of Indian Standards.
28. **Cooperative Group Housing Societies/ Builder flats:** A Housing Society is a society formed by house owners within a residential complex. The housing society formed must be formally registered with registrar of co-operatives.
29. **KLD – Kilo Litre per day**
30. **EC<sub>GW</sub>** - Environmental compensation for drawing illegal ground water.
31. **EC<sub>GWR</sub>** - Environmental compensation rates for drawing illegal ground water.

## ANNEXURE X

### Annual water audits by the industries (Source – CII)

Water audit is a systematic process of objectively obtaining a water balance by measuring flow of water from the site of water withdrawal or treatment, through the distribution system, and into areas where it is used and finally discharged. Conducting a water audit involves calculating water balance, water use and identifying ways for saving water.

Water audit involves preliminary water survey and detailed water audit. Preliminary water survey is conducted to collect background information regarding plant activities, water consumption and water discharge pattern and water billing, rates and water cess. After the analysis of the secondary data collected from the industry, detailed water audit is conducted, which involves the following steps:

- On site training and discussion with facility manager and personnel
- Water system analysis
- Quantification of baseline water map
- Monitoring and measurements using pressure and flow meters and various other devices
- Quantification of inefficiencies and leaks
- Quantification of water quality loads and discharges
- Quantification of variability in flows and quality parameters
- Strategies for water treatment and reuse or direct use

A detailed water balance is finally developed. Water quality requirement at various user areas is mapped, which helps in developing 'recycle' and 'reuse' opportunities.

The detailed water audit report contains the following:

- Water consumption and wastewater generation pattern
- Specific water use and conservation
- Complete water balance of the facility
- Water saving opportunities
- Method of implementing the proposals
- Full description and figures
- Investment required

Industries can undertake following measures for water conservation:

- Setting up of norms for water budgeting
- Modernization of industrial process to reduce water consumption
- Recycling water with a re-circulating cooling system
- Ozonation cooling water approach which can result in five fold reduction in blow down when compared to traditional chemical treatment
- Reduction in reuse of de-ionized water by eliminating some plenum flushes, converting from a continuous flow to an intermittent flow system and improving control on the use
- Use of waste water for gardening
- Proper processing of effluents to adhere to the norms of disposal.



# भारत का राजपत्र The Gazette of India

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असाधारण  
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)  
PART II—Section 3—Sub-section (ii)

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जल शक्ति मंत्रालय

(जल संसाधन, नदी विकास और गंगा संरक्षण विभाग)

(केंद्रीय भूमिजल प्राधिकरण)

अधिसूचना

नई दिल्ली, 29 मार्च, 2023

का.आ. 1509(अ).—पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 5 के साथ पठित धारा 3 की उप-धारा (3) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए जल संसाधन, नदी विकास और गंगा संरक्षण विभाग एतद द्वारा भारत के राजपत्र, असाधारण, भाग II, खंड 3, उप-खंड (ii) में अधिसूचना संख्या एस.ओ. 3289 (अ) 24 सितंबर, 2020, में भूजल के निष्कर्षण को विनियमित और नियंत्रित करने के लिए प्रकाशित दिशानिर्देशों में निम्नलिखित संशोधन करता है अर्थात्:-

उक्त अधिसूचना में अनुसूची के लिए अनुसूची में निम्नलिखित परिवर्तनों को प्रतिस्थापित/जोड़ा जाएगा, अर्थात्:-

"अनुसूची

1. भारत में भूजल निकासी को विनियमित और नियंत्रित करने के लिए दिशानिर्देश, 2020 में-

(क) इंडेक्स में मद संख्या 16.0 में, "दंड का प्रावधान" शब्दों के लिए "एनओसी में सुधार/संशोधन के लिए दंड और शुल्क का प्रावधान" शब्दों को प्रतिस्थापित किया जाएगा।

(ख) इंडेक्स में, अनुलग्नक में, "अनुबंध VI: आधारभूत परियोजनाओं की सांकेतिक सूची", शब्दों के स्थान पर, "अनुबंध VI: स्थान विशिष्ट आधारभूत परियोजनाओं की सांकेतिक सूची" शब्दों को प्रतिस्थापित किया जाएगा।

(ग) इंडेक्स में, अनुलग्नक में, "अनुबंध X: उद्योगों द्वारा वार्षिक जल लेखा परीक्षा", शब्दों के स्थान पर, "अनुबंध X: उद्योगों द्वारा जल लेखा परीक्षा" शब्दों को, प्रतिस्थापित किया जाएगा।

2. उक्त दिशानिर्देशों में पैरा 1.0 में, खंड (v) के बाद, खंड (vi), (vii) को जोड़ा जाएगा, अर्थात्: -

"(vi) सभी आकलन इकाइयों में केवल पीने/घरेलू प्रयोजनों के लिए 5 घन मीटर/दिन तक भूजल की निकासी करने वाले सभी उद्योग/खनन परियोजनाएं/अवसंरचना परियोजनाएं।

(vii) आवासीय अपार्टमेंट और ग्रुप हाउसिंग सोसाइटी:

(क) दिशानिर्देशों के पैरा 2.0 में उल्लिखित शर्तों के अधीन पेय जल और घरेलू उपयोग के लिए 20 घन मीटर /दिन तक भूजल की निकासी।

(ख) सरकारी योजनाओं के तहत आर्थिक रूप से कमजोर वर्गों (ईडब्ल्यूएस) के लिए आवास इकाइयां"।

3. उक्त दिशा-निर्देशों के पैरा 2.0 में:-

(i). उप-पैरा 2 जोड़ा जाएगा अर्थात्:-

" सभी आवासीय अपार्टमेंट और ग्रुप हाउसिंग सोसाइटी के लिए सभी निष्कर्षण संरचना (ओं) में डिजिटल जल प्रवाह मीटर (बीआईएस / आईएस मानकों के अनुरूप) की संस्थापना अनिवार्य होगी। ऐसे सभी आवासीय अपार्टमेंट और ग्रुप हाउसिंग सोसाइटी, जिनमें स्विमिंग पूल हैं और भूजल की निकासी की जा रही है, के लिए अनापत्ति प्रमाण पत्र प्राप्त करना अनिवार्य होगा।"

(ii). खंड (घ) के लिए निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्: -

"घ) खारे भूजल के निष्कर्षण के मामले में, किसी भी नेशनल अक्रेडीशन बोर्ड फॉर टेस्टिंग एंड कैलिब्रेशन लैबोरेटरी (एनएबीएल) से मान्यता प्राप्त प्रयोगशाला या सरकार द्वारा स्वीकृत प्रयोगशाला से मौजूदा बोरवेल / नलकूप / खोदे गए कुएं का भूजल गुणवत्ता डेटा।

**नोट:** नई परियोजनाओं के मामले में खारे भूजल की निकासी के लिए उपर्युक्त प्रयोगशालाओं से निकटवर्ती मौजूदा कुओं के जल की गुणवत्ता के आंकड़े/ की रिपोर्ट प्रस्तुत की जाए।

(iii) खंड (ङ) के लिए निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"ङ) आवेदक द्वारा सरकारी एजेंसी को प्रस्तुत वर्षा जल संचयन योजना की प्रति अथवा आवास और शहरी मामलों के मंत्रालय, भारत सरकार द्वारा जारी मॉडल बिलडिंग उपनियमों के अनुसार परियोजना परिसर में वर्षा जल संचयन/पुनर्भरण के लिए प्रस्ताव।"

(iv). पैरा 2.0 में, खंड (ड) के बाद, एक और खंड (च) अंतःस्थापित / जोड़ा जाएगा, अर्थात्:-

"च) सभी नई परियोजनाओं के लिए, परियोजना के पूरा होने की तारीख के उल्लेख सहित एक स्वतः घोषणा/शपथ पत्र (विधिवत नोटरीकृत) अनिवार्य होगा।"

4. पैरा 4.0 में उप पैरा 3 के स्थान पर निम्नलिखित उप पैरा प्रतिस्थापित किया जाएगा, अर्थात्:-

"भूजल का निष्कर्षण करने वाली वाणिज्यिक संस्थाओं को प्रासंगिक धाराओं में उल्लिखित अनुसार जल के उपयोग के लेखापरीक्षा सहित ऑनलाइन जल लेखापरीक्षा रिपोर्ट जमा करनी होगी। सीजीडब्ल्यूए/राज्य भूजल प्राधिकरण (एसजीडब्ल्यूए) ऐसी सभी ऑडिट रिपोर्ट को ऑनलाइन प्रकाशित करेगा।

**5. पैरा 4.1 में:-**

(i). खंड (iii) के स्थान पर निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(iii) 100 घनमीटर/दिन से अधिक भूजल का निष्कर्षण करने वाले सभी उद्योगों को सीजीडब्ल्यूए द्वारा अनुमोदित एजेंसियों के प्रमाणित लेखा परीक्षकों के माध्यम से द्विवार्षिक (दो वर्ष में एक बार) जल लेखा परीक्षा करनी होगी और इसके पूरा होने के तीन माह के भीतर सीजीडब्ल्यूए को लेखापरीक्षा रिपोर्ट प्रस्तुत करनी होगी। पहले दी गई रिपोर्टों के अनुपालन की जाँच एक वर्ष के बाद प्रमाणित जल लेखा परीक्षकों द्वारा की जाए और इस संबंध में रिपोर्ट सीजीडब्ल्यूए के साथ साझा की जाए।

ऐसे सभी उद्योगों को उपयुक्त उपायों के माध्यम से अगले तीन वर्षों में अपने भूजल के उपयोग में कम से कम 20% तक कटौती करनी होगी।"

(ii) खंड (iv) के लिए निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(iv). औद्योगिक क्षेत्रों (केंद्रीय/राज्य सरकार द्वारा निर्दिष्ट या अधिसूचित) में, केंद्रीय भूमि जल बोर्ड (सीजीडब्ल्यूबी) स्थानीय जल-भूवैज्ञानिक स्थितियों के अनुसार आवश्यकता-आधारित पीजोमीटर का निर्माण करेगा और जल स्तर की मॉनिटरिंग करेगा।

ऊपर उल्लिखित औद्योगिक क्षेत्रों के अतिरिक्त हार्ड रॉक एक्विफर प्रकार के लिए 100 घन मीटर /दिन से अधिक और एल्यूवियम एक्विफर प्रकार के लिए 500 घन मीटर /दिन से अधिक भूजल की निकासी के लिए परिसर के भीतर प्रेक्षण कुओं/(पीजोमीटर) का निर्माण और धारा 14 में उल्लिखित उपयुक्त जल स्तर मॉनिटरिंग तंत्र की स्थापना उद्योगों/अवसंरचना निकासी / निकासी के प्रस्ताव के लिए अनिवार्य होगी। इन क्षेत्रों में जल स्तर की मॉनिटरिंग परियोजना प्रस्तावकों द्वारा की जाएगी। यदि टैप किया गया जलभृत कठोर चट्टानी है तो निष्कर्षण संरचना और पीजोमीटर के बीच न्यूनतम दूरी 15 मीटर होगी और यदि जलभृत जलोढ है तो यह दूरी 50 मीटर होगी। पीजोमीटर में टैप की गई गहराई और जलभृत क्षेत्र पम्पिंग कुएं/कुओं के समान होंगे। पीजोमीटर के डिजाइन और निर्माण के लिए विस्तृत दिशा-निर्देश अनुबंध II में दिए गए हैं। वेब पोर्टल के माध्यम से सीजीडब्ल्यूए को मासिक जल स्तर डेटा प्रस्तुत किया जाएगा।"

(iii) खंड (ग) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(ग). खारे भूजल के निष्कर्षण के मामले में, किसी भी एनएवीएल मान्यता प्राप्त प्रयोगशाला या सरकार द्वारा अनुमोदित प्रयोगशाला से मौजूदा बोरवेल/ट्यूबवेल/कुएं के भूजल गुणवत्ता डेटा।

**नोट:** नई परियोजनाओं के मामले में खारे भूजल की निकासी के लिए उपर्युक्त प्रयोगशालाओं से जल की गुणवत्ता के आंकड़े/निकटवर्ती मौजूदा कुओं की रिपोर्ट प्रस्तुत की जा सकती है।

(iv) खंड (घ) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(घ) सभी नई परियोजनाओं के लिए नई स्थापना/प्रचालन के आरंभ के प्रमाण के रूप में दस्तावेज अर्थात् स्थापना के लिए सहमति/पर्यावरणीय मंजूरी/किसी वैधानिक एजेंसी से कोई अन्य दस्तावेज।

(v) खंड (ङ) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(ङ) आवेदक द्वारा सरकारी एजेंसी को प्रस्तुत वर्षा जल संचयन योजना की प्रति अथवा आवास और शहरी मामलों के मंत्रालय, भारत सरकार द्वारा जारी प्रचलित मॉडल बिल्डिंग उपनियमों के अनुसार परियोजना परिसर में वर्षा जल संचयन / पुनर्भरण का प्रस्ताव।

(vi) खंड (च) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(च)प्रभाव आकलन रिपोर्ट: अति-दोहित, गंभीर और अर्ध-महत्वपूर्ण क्षेत्रों में 100 घन मीटर/दिन से अधिक और गैर-जलोढ आच्छादित क्षेत्रों में 500 घन मीटर/दिन से अधिक और सुरक्षित आकलन इकाइयों में जलोढ क्षेत्रों में 2000 घन मीटर/दिन से अधिक भूजल निकालने वाली सभी परियोजनाओं को अनिवार्य रूप से मान्यता प्राप्त सलाहकारों द्वारा तैयार परियोजना स्थल के आसपास के 5 किमी त्रिज्या क्षेत्र को शामिल करते हुए भूजल प्रणाली पर मौजूदा / प्रस्तावित भूजल निकासी के प्रभाव मूल्यांकन रिपोर्ट और भूजल मॉडलिंग अध्ययन को अनिवार्य रूप से प्रस्तुत करना होगा। रिपोर्ट का प्रपत्र अनुबंध IV में दिया गया है।"

#### 6. पैरा 4.2 में,

(i). खंड (ii) के स्थान पर निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"ii) 100 घन मीटर/दिन से अधिक भूजल निकालने/प्रस्तावित करने वाले खानों के लिए के लिए मासिक भूजल स्तर की मॉनिटरिंग के लिए परिसर में परिधि के साथ प्रेक्षण कुएं (पीजोमीटर) का निर्माण अनिवार्य होगा। पीजोमीटर में टैप की गई गहराई और जलभृत क्षेत्र बफर क्षेत्र में सिंचाई/ पेय जल के लिए उपयोग किए जाने वाले जलभृत के अनुरूप होगा। पीजोमीटर के डिजाइन और निर्माण के लिए विस्तृत दिशा-निर्देश अनुबंध II में दिए गए हैं।"

(ii). खंड (ख) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्: -

"(ख) आवेदक द्वारा सरकारी एजेंसी को प्रस्तुत वर्षा जल संचयन योजना की प्रति अथवा आवास और शहरी मामलों के मंत्रालय, भारत सरकार द्वारा जारी प्रचलित मॉडल भवन उपनियमों के अनुसार परियोजना परिसर में वर्षा जल संचयन / पुनर्भरण के लिए प्रस्ताव अथवा जैसा कि खान के परिसर में व्यवहार्य है और जैसा कि सीजीडब्ल्यूए/राज्य एजेंसियों द्वारा अनुमोदित है।"

(iii). खंड (ग) के बाद, एक और खंड (घ) अंतःस्थापित किया जाएगा, अर्थात्:-

"(घ) सभी नई परियोजनाओं के लिए नई परियोजना/प्रचालन की शुरुआत के प्रमाण के रूप में दस्तावेज अर्थात् स्थापना के लिए सहमति/पर्यावरणीय मंजूरी/किसी वैधानिक एजेंसी से कोई अन्य दस्तावेज।"

#### 7. पैरा 4.3 में:-

(i). उप पैरा 3 में, "आधारभूत परियोजनाओं की सांकेतिक सूची अनुलग्नक VI में दी गई है" शब्दों के स्थान पर, "पेय /घरेलू उपयोग के लिए भूजल की आवश्यकता वाले वाणिज्यिक आधारभूत परियोजनाओं को भी इस श्रेणी के अंतर्गत शामिल किया जाएगा"। इसके अतिरिक्त स्थान विशिष्ट आधारभूत परियोजनाओं की सांकेतिक सूची अनुबंध VI में दी गई है" को इसके बाद दिए गए संशोधित अनुबंध VI द्वारा प्रतिस्थापित किया जाएगा।

(ii). खंड (v) के बाद, एक और खंड (vi) जोड़ा जाएगा, अर्थात्:-

"(vi) सभी स्टेडियम, क्रिकेट मैदान और अन्य खेल मैदान/कोर्ट, गोल्फ कोर्स आदि भूजल के कृत्रिम पुनर्भरण/वर्षा जल संचयन के लिए उपयुक्त प्रणाली तंत्र का निर्माण/स्थापना करेंगे।

(iii). खंड (क) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(क) ऐसे मामलों में जहां डीवाटरिंग शामिल है, मान्यता प्राप्त सलाहकार द्वारा क्षेत्र में भूजल की स्थिति पर 5 किमी के दायरे में भूजल मॉडलिंग सहित प्रभाव आकलन रिपोर्ट प्रस्तुत करना, जिसमें पंपिंग की विस्तृत योजना, पंप किए गए जल के प्रस्तावित उपयोग और व्यापक भूजल व्यवस्था के प्रभाव का आकलन अनिवार्य होगा। इस रिपोर्ट में किसी भी प्रकार के महत्वपूर्ण पर्यावरणीय मुद्दों जैसे भूजल स्तर में गिरावट, भूस्खलन आदि को दूर करने के लिए पर्यावरणीय जोखिमों और प्रस्तावित प्रबंधन कार्यनीतियों को उजागर करना होगा।

(iv). खंड (ड) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्: -

"(ड) आवेदक द्वारा सरकारी एजेंसी को प्रस्तुत वर्षा जल संचयन योजना की प्रति या आवास और शहरी मामलों के मंत्रालय, भारत सरकार द्वारा जारी प्रचलित मॉडल बिल्डिंग उपनियमों के अनुसार परियोजना परिसर में वर्षा जल संचयन / पुनर्भरण के लिए प्रस्ताव।"

(v). खंड (छ) के बाद, एक और खंड (ज) अंतःस्थापित किया जाएगा, अर्थात्: -

"(छ) सभी नई परियोजनाओं के लिए भवन योजना अनुमोदन या किसी वैधानिक एजेंसी से नई परियोजना के प्रमाण के रूप में कोई अन्य प्रासंगिक दस्तावेज।"

8. पैरा 5.1 के तहत खंड I में, तालिका 5.1 के स्थान पर, निम्नलिखित तालिका 5.1 को प्रतिस्थापित किया जाएगा, अर्थात्:

तालिका 5.1 पेय और घरेलू उपयोग के लिए भूजल निकासी शुल्क

भूजल निकासी की मात्रा (घन मीटर /दिन)	भूजल निकासी शुल्क की दर (रु. प्रति घन मीटर)
0-25	कोई शुल्क नहीं
> 25- < 200	1.00
200 और अधिक	2.00

पेय /घरेलू उपयोग के लिए जल की आपूर्ति करने वाली सरकारी/सरकार द्वारा अधिकृत एजेंसियां तथा सरकारी आधारभूत परियोजनाओं को भूजल निकासी की मात्रा पर विचार किए बिना भूजल निकासी शुल्क @ 0.50 रुपये प्रति घन मीटर का भुगतान करना होगा।"

9. पैरा 6.0, उप पैरा 2 में निम्नलिखित को प्रतिस्थापित किया जाएगा, अर्थात्:-

"ऐसे सभी उपयोगकर्ता जिनके द्वारा भूजल की निकासी की जा रही है और निजी टैंकों के माध्यम से थोक जल आपूर्ति के उद्देश्य से इसका उपयोग किया जा रहा है, उन्हें सीजीडब्ल्यूए द्वारा समय-समय पर जारी और अद्यतन किए गए थोक जल आपूर्तिकर्ताओं के दिशानिर्देशों के अनुसार अनिवार्य रूप से भू-जल निकासी के लिए अनापत्ति प्रमाण पत्र प्राप्त करना होगा।"

10. पैरा 7.0, उप पैरा 3 में निम्नलिखित को प्रतिस्थापित किया जाएगा, अर्थात्:-

"खारे भूजल का निष्कर्षण सीजीडब्ल्यूए द्वारा खारे भूजल निकासी के लिए समय-समय पर जारी और अद्यतन दिशानिर्देशों के अनुसार होगा।"

11. पैरा 8.0 में,

उप पैरा 2 में निम्नलिखित को प्रतिस्थापित किया जाएगा, अर्थात्:-

"सीमांकित आर्द्र-भूमि क्षेत्रों की परिधि से 500 मीटर के भीतर आने वाली परियोजनाओं को अनिवार्य रूप से विस्तृत प्रस्ताव प्रस्तुत करना होगा, जिसमें यह उल्लेख किया गया हो कि परियोजना प्रस्तावक द्वारा भूजल निकासी से किसी भी संरक्षित आर्द्रभूमि क्षेत्र पर विपरीत प्रभाव नहीं पड़ रहा है। इसके अतिरिक्त सीजीडब्ल्यूए से अनुमति लेने से पूर्व परियोजनाओं को क्षेत्र में अपनी परियोजनाओं को स्थापित करने के लिए उपयुक्त आर्द्रभूमि प्राधिकरण/राज्य प्राधिकरण या किसी अन्य उपयुक्त स्थानीय सरकारी प्राधिकरण से सहमति/अनुमोदन लेना होगा।"

12. पैरा 9.0 में:-

(i). खंड (i) के स्थान पर निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"(i). अनापत्ति प्रमाण पत्र का आवेदन करने वाले सभी उपयोगकर्ताओं के लिए एबस्ट्रेक्शन स्ट्रक्चर में टेलीमेट्री सिस्टम सहित टैम्पर प्रूफ डिजिटल वाटर फ्लो मीटर/प्री पेड मीटर (एस) (बीआईएस/आईएस मानकों के अनुरूप) की संस्थापना अनिवार्य होगी और अनापत्ति प्रमाण पत्र प्रदान करने के 30 दिनों के भीतर इसकी संस्थापना के विषय में वेब-पोर्टल के माध्यम से सीजीडब्ल्यूए को सूचित किया जाए।"

यदि भूजल निष्कर्षण एक ही परिसर के भीतर कई बोर/नलकूपों से होता है, तो टैम्पर-प्रूफ डिजिटल जल प्रवाह मीटर/ टेलीमेट्री के साथ प्री पेड मीटर को सामान्य आउटलेट बिंदु पर स्थापित किया जा सकता है।

(ii). खंड (iv) के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"iv. प्रस्तावक द्वारा धारा 5 में दी गई दरों के अनुसार भूजल निकासी की मात्रा के आधार पर भूजल निकासी / बहाली शुल्क का भुगतान किया जाएगा।

(iii). खंड (v) के स्थान पर निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्:-

"v. भूजल स्तर की मॉनिटरिंग के उद्देश्य से निर्मित प्रेक्षण कुएं (पीजोमीटर) धारा 14 के अनुसार संस्थापित किए जाएंगे। जल स्तर के आंकड़े वेब पोर्टल के माध्यम से सीजीडब्ल्यूए को उपलब्ध कराए जाएंगे। पीजोमीटर के निर्माण के लिए विस्तृत दिशा-निर्देश अनुबंध-II में दिए गए हैं।"

(iv). खंड IX के लिए, निम्नलिखित खंड को प्रतिस्थापित किया जाएगा, अर्थात्: -

"ix. स्वामित्व में परिवर्तन के मामले में, परिसर के नए मालिक को परिसर का कब्जा लेने के 60 दिनों के भीतर दस्तावेजी प्रमाण के साथ अनापत्ति प्रमाण पत्र में आवश्यक परिवर्तन शामिल करने के लिए आवेदन करना होगा।"

**13. पैरा 14.0 में,**

(i). उप पैरा 1 के स्थान पर निम्नलिखित को प्रतिस्थापित किया जाएगा, अर्थात्:-

"इसके पश्चात उल्लिखित औद्योगिक क्षेत्रों के अतिरिक्त, सभी परियोजना प्रस्तावकों (हार्ड रॉक एक्विफर प्रकार के लिए 100 घन मीटर /दिन से अधिक और एल्यूवियम एक्विफर प्रकार के लिए 500 घन मीटर /दिन से अधिक भूजल की निकासी के लिए) को अनिवार्य रूप से भूजल स्तर की मॉनिटरिंग के लिए अपने परिसर के भीतर पीजोमीटर (प्रेक्षण कुएँ) का निर्माण करना होगा। इसके अतिरिक्त औद्योगिक क्षेत्रों में (केंद्र / राज्य सरकार द्वारा निर्दिष्ट या अधिसूचित), केंद्रीय भूमि जल बोर्ड (सीजीडब्ल्यूबी) स्थानीय भूगर्भीय स्थितियों और जल स्तर की मॉनिटरिंग के अनुसार आवश्यकता-आधारित पीजोमीटर का निर्माण करेगा। परियोजना क्षेत्र में भूजल स्तर की नियमित मॉनिटरिंग को सुनिश्चित करने के उद्देश्य से ऐसा अनुपालन तंत्र बनाया गया है। इस संबंध में परियोजना प्रस्तावकों द्वारा पीजोमीटर के माध्यम से जल स्तर की मॉनिटरिंग के लिए आवश्यक मानदंड तालिका 14.1 में दिए गए हैं।"

(ii). तालिका 14.1 के लिए निम्नलिखित तालिका को प्रतिस्थापित किया जाएगा, अर्थात्: -

तालिका 14.1 डिजिटल वाटर लेवल रिकॉर्डर ( डीडब्ल्यूएलआर )और टेलीमेट्री के साथ निर्माण किए जाने वाले पीजोमीटर की संख्या और जल स्तर मॉनिटरिंग तंत्र के प्रकार		
क्र. सं .	भूजल निकासी की मात्रा (घन मीटर /दिन)	पीजोमीटर की संख्या (डीडब्ल्यूएलआर और टेलीमेट्री की सहित )
1.	0-100	0
2.	>100 (औद्योगिक क्षेत्रों के अतिरिक्त में हार्ड रॉक एक्विफर )	1
3.	>500 (औद्योगिक क्षेत्रों के अतिरिक्त में जलोढ जलभृत )	1

14. पैरा 16.0 में तालिका 16.1 में,

(i). क्रम संख्या 2, अर्थात् "गैर प्रकटीकरण / अतिरिक्त भूजल निष्कर्षण संरचनाओं का निर्माण

ए) गैर-कार्यात्मक संरचनाएं।

बी) अप्रचलित / परित्यक्त

नोट: दी गई दरें गैर-कार्यात्मक/अप्रचलित /परित्यक्त संरचनाओं के लिए हैं। समेकित जुमाने के आंकड़े के लिए इसे ऐसी कुल संरचनाओं से गुणा किया जाएगा ।

को निम्नलिखित से प्रतिस्थापित किया जाएगा

"अतिरिक्त भूजल निष्कर्षण संरचनाओं का गैर-प्रकटीकरण/निर्माण

क) कार्यात्मक / गैर-कार्यात्मक संरचनाएं।

बी) अप्रचलित / परित्यक्त

नोट: दी गई दरें कार्यात्मक/गैर-कार्यात्मक/अप्रचलित /परित्यक्त संरचनाओं के लिए हैं। समेकित जुमाने के आंकड़े के लिए इसे ऐसी कुल संरचनाओं से गुणा किया जाएगा ।

(ii). क्रम संख्या 7 के तहत, "पुनर्भरण संरचनाओं का रखरखाव न होना" शब्दों के स्थान पर "जल संरक्षण संरचनाओं/पुनर्भरण संरचनाओं का रखरखाव न होना" शब्दों को प्रतिस्थापित किया जाएगा।

(iii). पैरा 16.0 में उप पैरा 2 को प्रतिस्थापित किया जाएगा, अर्थात्:

" नए एनओसी / एनओसी के नवीनीकरण के लिए आवेदन शुल्क समय-समय पर सीजीडब्ल्यूए द्वारा निर्धारित दरों के अनुसार लिया जाएगा और इसे आधिकारिक वेब पोर्टल के माध्यम से सूचित किया जाएगा। मौजूदा जारी किए गए अनापत्ति प्रमाण पत्र में सुधार/संशोधन के लिए भी शुल्क देय होगा।".

(iv). तालिका 16.2 में,

i. तालिका के शीर्षक/शीर्षक के अंतर्गत, "प्रस्तावित शुल्क" शब्दों के स्थान पर "शुल्क" शब्द प्रतिस्थापित किया जाएगा ।

ii. क्रम. संख्या 1 (अर्थात् शब्द "लागू शुल्क सहित रिचार्ज मात्रा में परिवर्तन") का लोप किया जाएगा।

15. अनुलग्नक II में बुलेट बिंदु 1 के स्थान पर निम्नलिखित बुलेट बिंदु प्रतिस्थापित किया जाएगा, अर्थात्:-

यदि टैप किए जाने वाला जलभृत कठोर चट्टान है तो भूजल निकाले जाने वाले पम्पिंग कुएं से पीज़ोमीटर को 15 मीटर की न्यूनतम दूरी पर संस्थापित / निर्मित किया जाना है। यदि जलभृत जलोढ़ है तो यह दूरी 50 मीटर होगी। पीज़ोमीटर का व्यास लगभग चार इंच से छह इंच होना चाहिए।

16. उक्त दिशा-निर्देशों में, अनुलग्नक VI को निम्नलिखित अनुसार प्रतिस्थापित किया जाएगा:

"अनुबंध VI

स्थान विशिष्ट अवसंरचना परियोजनाओं की सांकेतिक सूची

क्र. सं.	अवसंरचनात्मक परियोजनाएं
1.	विशेष आर्थिक क्षेत्र
2.	मेट्रो स्टेशन/रेलवे स्टेशन और बस डिपो
3.	हवाई अड्डे, बंदरगाह, लॉजीस्टिक, कार्गो और गोदाम

4.	हाईवे इंफ्रास्ट्रक्चर
5.	अग्निशमन केंद्र
6.	अस्पताल और नर्सिंग होम
7.	स्कूल, कॉलेज, विश्वविद्यालय, कोचिंग संस्थान, प्रशिक्षण केंद्र/कौशल विकास केंद्र सहित शैक्षणिक संस्थान

**नोट:-** भूजल उपयोग के लिए एनओसी की आवश्यकता में पेयजल/घरेलू उपयोग के लिए जल की आवश्यकता भी शामिल है।

17. उक्त दिशा-निर्देशों में अनुलग्नक VIII को निम्नलिखित अनुसार प्रतिस्थापित किया जाएगा:

**"अनुबंध VIII**

**ऐसे राज्यों/केंद्र शासित प्रदेशों की सूची जहां केंद्रीय भूजल प्राधिकरण द्वारा भूजल निकासी का विनियमन किया जा रहा है**

1.	अंडमान और निकोबार
2.	असम
3.	अरुणाचल प्रदेश
4.	बिहार
5.	छत्तीसगढ़
6.	दादरा और नगर हवेली एवं दमन और दीव
7.	गुजरात
8.	झारखंड
9.	मध्य प्रदेश
10.	महाराष्ट्र
11.	मणिपुर
12.	मेघालय
13.	मिजोरम
14.	नागालैंड
15.	ओडिशा
16.	राजस्थान
17.	सिक्किम
18.	त्रिपुरा
19.	उत्तराखंड

**नोट:** उपरोक्त सूची परिवर्तनशील है और इसमें किसी भी प्रकार के जोड़/लोप को सीजीडब्ल्यूए द्वारा अपने आधिकारिक वेब पोर्टल के माध्यम से राज्यों/संघ शासित प्रदेशों, परियोजना प्रस्तावकों सहित उद्योगों को सूचित किया जाएगा।

**18. अनुलग्नक IX (प्रयुक्त तकनीकी शब्दों की शब्दावली) में क्रम संख्या 17 के तहत, "पेय और घरेलू उपयोग: पेय और घरेलू उपयोग के अलावा, यह श्रेणी अस्पताल, होटल, मॉल और मल्टीप्लेक्स, संस्थानों, कार्यालय, बैंकेट हॉल, फायर स्टेशन, मेट्रो स्टेशन, रेलवे स्टेशन, हवाई अड्डा, बंदरगाह, स्टेडियम आदि औद्योगिक प्रक्रिया के लिए आवश्यक जल नहीं बल्कि औद्योगिक के पेय जरूरतों को कवर करेगी" शब्दों के स्थान पर " पेय और घरेलू उपयोग: स्वच्छ उद्देश्यों यथा खाना पकाने, स्नान, सफाई/ धुलाई, स्वच्छता आदि सहित दैनिक घरेलू गतिविधियों के लिए आवश्यक जल। पेय और घरेलू उपयोग के अलावा, यह श्रेणी अस्पताल, होटल, मॉल और मल्टीप्लेक्स, संस्थानों, कार्यालय, बैंकेट हॉल, फायर स्टेशन, मेट्रो**

स्टेशन, रेलवे स्टेशन, हवाई अड्डा, बंदरगाह, स्टेडियम आदि औद्योगिक प्रक्रिया के लिए आवश्यक जल नहीं बल्कि औद्योगिक के पेय जरूरतों को कवर करेगी" प्रतिस्थापित किया जाएगा।

19. अनुलग्नक X में, शीर्षक के अंतर्गत, "उद्योगों द्वारा वार्षिक वाटर ऑडिट (स्रोत-CII)" शब्दों के स्थान पर, "उद्योगों द्वारा जल ऑडिट" शब्दों को प्रतिस्थापित किया जाएगा। "

[फा. सं. 23014/29/2021-समन्वय अनुभाग-भाग(2)]

आशीष कुमार, निदेशक

नोट: 'भारत के भूजल निकासी को विनियमित और नियंत्रित करने के दिशानिर्देश' भारत के राजपत्र, असाधारण, भाग II, खंड 3, उप-खंड (ii) में एस.ओ. 3289 (ई) द्वारा दिनांक 24 सितंबर, 2020 को प्रकाशित किए गए थे।

## MINISTRY OF JAL SHAKTI

(Department of Water Resources, River Development and Ganga Rejuvenation)

(CENTRAL GROUND WATER AUTHORITY)

### NOTIFICATION

New Delhi, the 29th March, 2023

**S.O. 1509(E).**— In exercise of the powers conferred by sub-section (3) of section 3 read with section 5 of the Environment (Protection) Act, 1986 (29 of 1986), the Department of Water Resources, River Development & Ganga Rejuvenation, hereby makes the following amendments to the guidelines to regulate and control groundwater extraction in India, published in the Gazette of India, Extraordinary, Part II, section 3, sub-section (ii), vide Notification number S.O. 3289 (E) 24<sup>th</sup> September, 2020, namely:-

In the said notification, for the Schedule, the following changes in the Schedule shall be substituted/added, namely:-

#### “Schedule

1. In the Guidelines to regulate and control groundwater extraction in India, 2020 -

(a) in the Index, Item no. 16.0, for the words “Provisions of Penalty” the words “Provision of Penalty and Charges for correction/modifications in NOCs” shall be substituted.

(b) in the index, in the Annexures, for the words, “Annexure VI : Indicative list of Infrastructure projects”, the words, “Annexure VI : Indicative list of location specific Infrastructure projects” shall be substituted.

(c) in the index, in the Annexures, for the words, “Annexure X : Annual water audits by the industries” , the words, “Annexure X : Water audits by the industries” shall be substituted.

2. In the said guidelines, in the paragraph 1.0, after clause (v), clauses (vi),(vii) shall be added namely:-

“(vi) All industries/ mining projects/ infrastructure projects drawing ground water only for drinking/ domestic purposes up to 5 Cum /day in all assessment units.

(vii) Residential Apartments and Group Housing Societies:

(a) For drinking water and domestic uses, drawing ground water upto 20 m<sup>3</sup>/day subject to the conditions mentioned in Para 2.0 of the guidelines.

(b) Dwelling units for Economically Weaker Sections (EWS) under Government schemes.”.

3. In the said guidelines, in the paragraph 2.0:-

(i). Sub-para 2 shall be added namely:-

“Installation of digital water flow meter (conforming to BIS/ IS standards) in all abstraction structure(s) shall be mandatory for all Residential Apartments and Group Housing Societies. All Residential Apartments and Group Housing Societies having swimming pools drawing ground water shall be mandatorily required to seek No Objection Certificate.”

(ii). for the clause (d), the following clause shall be substituted, namely:-

“d) In case of saline ground water extraction, ground water quality data of existing bore well/ tube well/ dug well from any National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratory or Govt. approved laboratory.

**Note:** In case of new projects, water quality data/report of nearby existing wells from above-mentioned laboratories may be submitted for saline ground water extraction.”.

(iii). for the clause (e), the following clause shall be substituted, namely:-

“e) Copy of Rain Water Harvesting Plan submitted to Government agency by the applicant or a proposal for rain water harvesting/ recharge in the project premises as per the prevailing Model Building Bye Laws issued by Ministry of Housing & Urban Affairs, Government of India.”.

(iv). in the paragraph 2.0, after the clause (e), one more clause (f), shall be inserted/added, namely:-

“f) For all New projects, a self declaration/ affidavit (duly notarized) indicating date of completion of project shall be required.”.

**4.** In the paragraph 4.0, for sub para 3, the following sub para shall be substituted, namely:-

“Commercial entities extracting ground water shall be required to submit online water audit report including an audit of water use as mentioned in the relevant sections. CGWA/ State Ground Water Authority (SGWA) shall publish all such audit reports online.”.

**5.** In the paragraph 4.1:-

(i). for clause (iii), the following clause shall be substituted, namely:-

“(iii). All industries abstracting ground water in excess of 100 m<sup>3</sup>/day shall be required to undertake biennial (once in two years) water audit through certified auditors of agencies as approved by CGWA and submit audit reports within three months of completion of the same to CGWA. Compliance of the earlier given reports may be checked by certified water auditors after one year and the report in this regard may be shared with CGWA.

All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means.”.

(ii). for clause (iv), the following clause shall be substituted, namely:-

“(iv). In industrial areas (as designated or, notified by Central/State Government), Central Ground Water Board (CGWB) shall construct need-based piezometers as per local hydro-geological conditions and further monitor water levels.

In other than industrial areas as mentioned above, construction of observation well(s)/(piezometer)(s) within the premises and installation of appropriate water level monitoring mechanism as mentioned in Section 14 shall be mandatory for industries/Infrastructure drawing/ proposing to draw more than 100 m<sup>3</sup> /day of ground water for Hard rock aquifer type and more than 500 m<sup>3</sup> /day of ground water for Alluvium aquifer type. Monitoring of water levels in these areas shall be done by the project proponents. Minimum distance between the abstraction structure and piezometer will be 15 m if the aquifer tapped is hard rock and 50 m if the aquifer is alluvium. Depth and aquifer zone tapped in the piezometer shall be the same as that of the pumping well/wells. Detailed guidelines for design and construction of piezometers are given in Annexure II. Monthly water level data shall be submitted to the CGWA through the web portal.”.

(iii). for clause (c), the following clause shall be substituted, namely:-

“(c). In case of saline ground water extraction, ground water quality data of existing bore well/ tube well/ dug well from any NABL accredited laboratory or Government approved laboratory.

**Note:** In case of new projects, water quality data / report of nearby existing wells from above-mentioned laboratories may be submitted for saline ground water extraction.”.

(iv). for clause (d), the following clause shall be substituted, namely:-

“(d). For all new projects, document as proof of new establishment / commencement of operation i.e. Consent to Establish/ Environmental Clearance/ any other document from a statutory agency.”.

(v). for clause (e), the following clause shall be substituted, namely:-

“(e). Copy of Rain Water Harvesting Plan submitted to Government agency by the applicant or a proposal for rain water harvesting/ recharge in the project premises as per the prevailing Model Building Bye Laws issued by Ministry of Housing & Urban Affairs, Government of India.”.

(vi). for clause (f), the following clause shall be substituted, namely:-

“(f). **Impact Assessment report:** All projects extracting/proposing to extract ground water in excess of 100 m<sup>3</sup>/day in Over-exploited, Critical and Semi-critical areas and in excess of 500 m<sup>3</sup>/day in areas underlain by non-alluvium and 2000 m<sup>3</sup>/day in areas underlain by alluvium in Safe assessment units shall have to mandatorily submit impact assessment report and ground water modeling study of existing/ proposed ground water withdrawal on the ground water regime covering 5 KM radius area around the project site prepared by accredited consultants. Pro-forma for the report is given in Annexure IV.”.

6. In the paragraph 4.2,

(i). for clause (ii), the following clause shall be substituted, namely:-

“(ii) Construction of observation well(s) (piezometers) along the periphery in the premises, for monthly ground water level monitoring, shall be mandatory for mines drawing/ proposing to draw more than 100 m<sup>3</sup>/day of ground water. Depth and aquifer zone tapped in the piezometer shall be commensurate with aquifer used for irrigation/drinking water in the buffer area. Detailed guidelines for design and construction of piezometers are given in Annexure II.”.

(ii). for clause (b), the following clause shall be substituted, namely:-

“(b) Copy of Rain Water Harvesting Plan submitted to Government agency by the applicant or a proposal for rain water harvesting/ recharge in the project premises as per the prevailing Model Building Bye Laws issued by Ministry of Housing & Urban Affairs, Government of India or as feasible in the mine premises and as approved by CGWA/State agencies”.

(iii). after clause (c), one more clause (d) shall be inserted, namely:-

“(d) For all New projects, document as proof of new project / commencement of operation i.e. Consent to Establish/ Environmental Clearance / any other document from a statutory agency.”.

7. In the paragraph 4.3:-

(i). in the sub para 3, for the words “Indicative list of Infrastructure projects is given in Annexure VI”, the words “Commercial infrastructure projects requiring ground water for drinking /domestic use shall also be covered under this category. Further, the Indicative list of location specific Infrastructure projects is given in Annexure VI” shall be substituted by revised Annexure VI given hereafter.

(ii). after clause (v), one more clause (vi) shall be inserted, namely:-

“(vi) All stadiums, cricket grounds, and other sports grounds/courts, golf courses etc shall construct/install appropriate mechanism for artificial recharge of ground water / rain water harvesting.

(iii). for clause (a), the following clause shall be substituted, namely:-

“(a) In cases where dewatering is involved, submission of impact assessment report along with groundwater modelling in 5 km radius prepared by an accredited consultant on the ground water situation in the area giving detailed plan of pumping, proposed usage of pumped water and comprehensive impact assessment of the same on the ground water regime shall be mandatory. The report should highlight environmental risks and proposed management strategies to overcome any significant environmental issues such as ground water level decline, land subsidence etc.”.

(iv). for clause (e), the following clause shall be substituted, namely:-

“(e) Copy of Rain Water Harvesting Plan submitted to Government agency by the applicant or a proposal for rain water harvesting/ recharge in the project premises as per the prevailing Model Building Bye Laws issued by Ministry of Housing & Urban Affairs, Government of India.”.

(v). after clause (g), one more clause (h) shall be inserted, namely:-

“(h) For all New projects, building plan approval or any other relevant document as proof of new project from a statutory agency.”.

8. In the Section I under paragraph 5.1, for the table 5.1, the following table 5.1 shall be substituted, namely:-

**“Table 5.1 Ground Water Abstraction charges for Drinking & Domestic use**

<b>Quantum of Groundwater withdrawal (m<sup>3</sup>/day)</b>	<b>Rate of ground water abstraction charges (Rs. per m<sup>3</sup>)</b>
0-25	No Charge
> 25- < 200	1.00
200 and above	2.00

Government/ Government authorized agencies supplying water for drinking/ domestic use and Government infrastructure projects shall pay ground water abstraction charges @ Rs. 0.50 per m<sup>3</sup> irrespective of quantum of ground water abstraction.”.

9. In the paragraph 6.0, sub para 2, the following shall be substituted, namely:-

“All those users abstracting ground water and using it for supply as bulk water supplies through private tankers shall mandatorily seek No Objection Certificate for ground water abstraction as per Guidelines for Bulk water suppliers as issued and updated by CGWA from time to time.”.

10. In the paragraph 7.0, sub para 3, the following shall be substituted, namely:-

“Abstraction of saline ground water shall be according to the Guidelines for Saline Ground Water Abstraction as issued and updated by CGWA from time to time.”.

11. In the paragraph 8.0,

In the sub para 2, the following shall be substituted, namely:-

“Projects falling within 500 m from the periphery of demarcated wetland areas shall mandatorily submit a detailed proposal indicating that any ground water abstraction by the project proponent does not affect the protected wetland areas. Furthermore, before seeking permission from CGWA, the projects shall take consent/approval from the appropriate Wetland Authority/ State Authority or any other appropriate local government authority to establish their projects in the area.”.

12. In the paragraph 9.0:-

(i). for clause (i), the following clause shall be substituted, namely:-

“(i). Installation of tamper proof digital water flow meter/ Pre Paid Meter (s) (conforming to BIS/ IS standards) having telemetry system in the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate through the web-portal.

In case the ground water extraction is from multiple bore/tube wells within the same premises, tamper-proof digital water flow meter(s)/Pre Paid Meter (s) with telemetry can be installed at common outlet point(s).”.

(ii). for clause (iv), the following clause shall be substituted, namely:-

“iv. Proponents shall pay ground water abstraction/ restoration charges based on quantum of ground water extraction as applicable as per the rates given in Section 5.”.

(iii). for clause (v), the following clause shall be substituted, namely:-

“v. Purpose-built observation wells (piezometers) for ground water level monitoring shall be installed as per Section 14. Water level data shall be made available to CGWA through web portal. Detailed guidelines for construction of piezometers are given in Annexure-II.”.

(iv). for clause ix, the following clause shall be substituted, namely:-

“ix. In case of change of ownership, new owner of the premises will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.”.

**13.** In the paragraph 14.0,

(i). for sub para 1, the following shall be substituted, namely:-

“In other than industrial areas as mentioned hereafter, all the project proponents (drawing ground water more than 100 m<sup>3</sup> /day of ground water for Hard rock aquifer type and more than 500 m<sup>3</sup> /day of ground water for Alluvium aquifer type have to mandatorily construct Piezometers (observation wells) within their premises for monitoring of the ground water levels. Further, in industrial areas (as designated or notified by Central/State Government), Central Ground Water Board (CGWB) shall construct need-based piezometers as per local hydro-geological conditions and further monitor water levels. Such a mechanism of compliance conditions has been made to ensure regular monitoring of ground water level in the project area. In this regard the necessary criteria for monitoring of water levels through piezometers by the project proponents is given in Table 14.1.”.

(ii). for Table 14.1, the following Table shall be substituted, namely:-

<b>Table 14.1 No. of Piezometers with Digital Water Level Recorder (DWLR) and telemetry to be constructed &amp; Type of Water Level Monitoring Mechanism</b>		
Sl. No.	Quantum of Ground water withdrawal (cum/day)	No. of piezometer(s) (with DWLR and telemetry required)
1.	0-100	0
2.	>100 (Hard rock aquifer type in other than industrial areas)	1
3.	>500 (Alluvium aquifer type in other than industrial areas)	1

**14.** In the paragraph 16.0, in the Table 16.1,

(i). Serial no. 2, i.e. “Non disclosure/ construction of additional groundwater abstraction structures

a) Non-functional Structures.

b) Defunct/Abandoned

Note: Given rates are for unit non-functional/ defunct/ abandoned structures. This shall be multiplied with total such structures to arrive at consolidated penalty”,

shall be substituted with

“Non disclosure/ construction of additional groundwater abstraction structures

a) Functional / Non-functional Structures.

b) Defunct / Abandoned

Note: Given rates are for unit Functional/non-functional/ defunct/ abandoned structures. This shall be multiplied with total such structures to arrive at consolidated penalty.”

(ii). under the serial no. 7, for the words, “Non maintenance of Recharge structures”, the words “Non maintenance of water conservation structures/ recharge structures” shall be substituted.

(iii). in the paragraph 16.0, the sub para 2 shall be substituted, namely:-

“Application fee for fresh/ renewal of NOC shall be charged as per the rates prescribed by CGWA from time to time and intimated through the official web portal. Fee shall also be payable for correction/ modification in the existing issued No Objection Certificate letter.”.

(iv). in the Table 16.2,

- i. under the heading/heading of the table, for the words “Proposed Charges” the words “Charges” shall be substituted.
- ii. the serial no. 1 ( i.e the words " Change in recharge quantum including applicable charges" ) shall be deleted.

15. In the Annexure II, for bullet point 1, the following bullet point shall be substituted, namely:-

“The piezometer is to be installed / constructed at the minimum distance of 15 m if the aquifer tapped is hard rock and 50 m if the aquifer is alluvium from the pumping well through which ground water is being withdrawn. The diameter of the piezometer should be about four inches to six inches.”.

16. In the said guidelines, **Annexure VI** shall be substituted as given hereafter:

**“Annexure VI**

**Indicative list of location specific Infrastructure Projects**

Sl. No.	Infrastructure Projects
1.	Special Economic Zone
2.	Metro Station/Railway Station & Bus Depot
3.	Airport, Seaport, Logistics, Cargo & Warehouse
4.	Highway Infrastructure
5.	Fire station
6.	Hospitals & Nursing Homes
7.	Educational Institutions including schools, colleges, universities, coaching institutes, Training Centres/ Skill development centres

**Note:-** The requirement of NOC for Groundwater use may include the water requirement for drinking water/domestic uses also.

17. In the said guidelines, **Annexure VIII** shall be substituted as given hereafter:

**“Annexure VIII**

**List of States/Union territories where ground water extraction is being regulated by Central Ground Water Authority**

1.	Andaman & Nicobar
2.	Assam
3.	Arunachal Pradesh
4.	Bihar
5.	Chhattisgarh
6.	Dadra and Nagar Haveli and Daman & Diu
7.	Gujarat
8.	Jharkhand
9.	Madhya Pradesh
10.	Maharashtra

11.	Manipur
12.	Meghalaya
13.	Mizoram
14.	Nagaland
15.	Odisha
16.	Rajasthan
17.	Sikkim
18.	Tripura
19.	Uttarakhand

**Note:** The above list is dynamic in nature and any addition/deletion in this regard shall be communicated to the States/UTs, project proponents including industries by CGWA through its official web portal.”

**18.** In the **Annexure IX (Glossary of technical terms used)**, under the serial no. 17, for the words “Drinking and domestic use: Besides drinking & domestic use of households, this category will cover drinking requirement of industries not requiring water for industrial process; drinking, washing, cleaning use etc. in case of hospitals, hotels, malls & multiplexes, institutions, offices, banquet halls, fire stations, metro stations, railway stations, airports, sea ports, stadia etc.”, the words, “**Drinking and domestic use:** Water required for daily household activities including hygienic purposes, such as cooking food, bathing, cleaning / washing, sanitation etc. Besides drinking & domestic use of households this category will cover drinking requirement of industries not requiring water for industrial process; drinking, washing, cleaning use etc. in case of hospitals, hotels, malls & multiplexes, institutions, offices, banquet halls, fire stations, metro stations, railway stations, airports, sea ports, stadia etc.” shall be substituted.”

**19.** In the **Annexure X**, under the heading, for the words “Annual water audits by the industries (Source-CII)”, the words, “Water audits by the industries” shall be substituted. ”

[F. No. 23014/29/2021-Coordination Section- Part(2)]

ASHISH KUMAR, Director

**Note:** he ‘Guidelines to control and regulate ground water extraction in India’ were published in Gazette of India, Extraordinary, Part II, section 3, sub-section (ii) vide S.O. 3289 (E) dated 24<sup>th</sup> September, 2020.

## Inspection Photographs in OA 176/2024 dated 22/10/2024



Discussion of the committee at RuchiLifeS capes, Jatkhedi, Hoshangabad Road, Bhopal



कार्यालय संयुक्त संचालक नगर तथा ग्राम निवेश जिला भोपाल-सीकर  
मध्यप्रदेश

संख्या 120/एन सी-38/सामानि/निकास/2008

दिनांक 12/08/2008

मेसर्स हाइट स्टार इन्फ्रास्ट्रक्चर प्रायवेट लिमिटेड,  
द्वारा श्री पी. आर. बाजीरिया सुपुत्र श्री डी. पी. बाजीरिया,  
मेसर्स अक्सनानी डिस्ट्रीब्यूटर्स एण्ड रेंटलपार्स प्रायवेट लिमिटेड,  
श्री अशोक कुमार सुपुत्र श्री हरीप्रसाद, श्री जसवी नाथमण सुपुत्र श्री कुंजीलाल गुजराती,  
श्री सताप, श्री रामकृष्ण सुपुत्र श्री कलश, कुमारी रामा सुपुत्री कलश  
द्वारा मेसर्स हाइट स्टार इन्फ्रास्ट्रक्चर प्रायवेट लिमिटेड भोपाल

विषय :-

संस्था की ग्राम जाटखेडी तहसील हजूर जिला भोपाल स्थित जमीन के खसरा क्रमांक  
39/1/1/1, 40,41/1, 42/2/1/2,43, 42/43/1/1, 42/43/2/2, 42/43,3/2,  
45/1, 45/2, 46/1/1, 46/2, 48, 114/1/1, 114/1/2, 114/2, 114/3, 115/1,  
115/2, 116, 117/1/क, 117/1/ख, 118/1, 118/2, 119, 121/3/1,136,  
121/2/1,136, 166/112, 117/2, 122-123, 123/2, 123/3, 123/4, 123/5  
रकबा 33.762 हेक्टर ग्राम कटारा खसरा क्रमांक 246,247 रकबा 0.85 हेक्टर कुल रकबा  
34.348 हेक्टर में से स्थल पर सत्यापन स्थला 34.348 हेक्टर 343482.00 वर्गमीटर भूमि  
के अनुमोदित अभिन्यास का स्थल पर सत्यापन राखित ।

सन्दर्भ :-

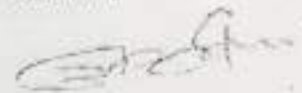
आपका पत्र भोपाल दिनांक 3.5.2008

उपरोक्त संदर्भित पत्र के तारतम्य में सूचित है कि ग्राम जाटखेडी तहसील हजूर जिला  
भोपाल स्थित जमीन के खसरा क्रमांक 39/1/1/1, 40,41/1, 42/2/1/2,43, 42/43/1/1,  
42/43/2/2, 42/43,3/2, 45/1, 45/2, 46/1/1, 46/2, 48, 114/1/1, 114/1/2, 114/2,  
114/3, 115/1, 115/2, 116, 117/1/क, 117/1/ख, 118/1, 118/2, 119, 121/3/1,136,  
121/2/1,136, 166/112, 117/2, 122-123, 123/2, 123/3, 123/4, 123/5 रकबा 33.762  
हेक्टर ग्राम कटारा खसरा क्रमांक 246,247 रकबा 0.85 हेक्टर कुल रकबा 34.348 हेक्टर में से स्थल पर  
उपलब्ध रकबा 34.348 हेक्टर 343482.00 वर्गमीटर भूमि के इस कार्यालय के पत्र क्रमांक 188 दिनांक  
8.4.2008 द्वारा अनुमोदित अभिन्यास का स्थल पर सत्यापन राजस्व निरीक्षक द्वारा आपकी उपस्थिति  
बतलाई गई संस्था की भूमि सीमा के अनुसार निम्न शर्तों के साथ किया जाता है ।

1. इस कार्यालय के पत्र क्रमांक 188 दिनांक 8.4.2008 में उल्लेखित अभिन्यास समस्त शर्तों के साथ यथावत रहेगा ।
2. खसरा भूमि की बाह्य सीमा में अन्य प्रकार का विवाद होने पर अनुमोदित अभिन्यास इस सत्यापन सहित निरस्त माना जावेगा
3. अपूर्ण भूखण्ड समायोजन के बाद पूर्ण होने पर ही मान्य किये जावेगे जिराकी अनुमति इस कार्यालय से लेना अनिवार्य होगा
4. शासकीय मार्ग से प्रभावित समस्त/मकान एवं भूखण्ड का निर्माण/विकास नियमानुसार राजस्व विभाग से अनापत्ति प्राप्त करने के पश्चात ही मान्य किया जावेगा ।
5. प्रस्तावित अभिन्यास में मध्य प्रदेश नगर पालिका ( कालोनाईजर का रजिस्ट्रीकरण विनियम तथा शर्तें ) नियम 1998 के नियम 10(4) के अनुसार कमजोर आय वर्ग हेतु नियमानुसार संबंधित संस्था में आश्रय शुल्क जमा करना अनिवार्य होगा। इसका अनुपालन नगर निगम द्वारा सुनिश्चित कराया जावेगा.
6. विकास अनुज्ञा सत्यापन के उपरान्त नगर निगम,भोपाल से निर्माण कार्य के लिए निवमानुसार अनुमतिपत्र प्राप्त की जाना आवश्यक होगा ।
7. शासन आदेश क्रमांक 106/32/98 दिनांक 23.1.1998 के अनुपालन में 15 रु। प्रति हेक्टर के

8. मान अनुसार मूखण्ड के वृक्षारोपण के अतिरिक्त वृक्षारोपण किया जाना अनिवार्य होगा । प्रस्तावीन स्थल की सीमा तक दर्शाये गये मार्गों की निरंतरता सुनिश्चित किया जाना अनिवार्य होगा । अतः मार्गों को गेट अथवा बाउण्ड्रीवाल से अवरुद्ध किया जाना मान्य नहीं होगा ।
9. स्थल पर विकास कार्य पूर्णता प्रमाण पत्र नगर निगम से प्राप्त करने के पश्चात ही किसी प्रकार का भवन निर्माण कार्य मान्य होगा ।
10. इस मानचित्र के आधार पर ही सदरस्थों को मूखण्ड/भवन का पंजीयन किया जाना सुनिश्चित किया जावे ।
11. संस्था को मध्य प्रदेश भूमि विकास नियम, 1984 के नियम 31 के प्रावधानों का पालन करना होगा तथा अपेक्डिक्स ई 'एफ' तथा 'जी' संवर्गी आवश्यक कार्यवाही समय सीमा में करना अनिवार्य होगा ।
12. इस मानचित्र को भूमि स्वामित्व का दस्तावेज न समझा जावे ।
13. एच.टी. लाईन, इलेक्ट्रिक लाईन के नीचे स्थित मूखण्ड मान्य नहीं होंगे इन पर भवन अनुज्ञा न दी जावे ।

उपरोक्त किसी भी शर्त का उल्लंघन होने पर इस भूमि पर प्रदत्त विकास अनुज्ञा मध्य प्रदेश भूमि विकास नियम 1984 के नियम 25 के तहत रिवॉक कर ली जावेगी ।



संयुक्त संचालक  
नगर तथा ग्राम निवेश, जिला भोपाल  
भोपाल, दिनांक 2008

/नगानि/एल.पी 39 /2008

*JK*

शु. कुमार  
प्रतिनिधि

- 1.
- 2.

इलेक्टर जिला भोपाल को कृपया सूचनार्थ एवं आवश्यक कार्यवाही हेतु ।  
आयुक्त एवं राक्षम प्राधिकारी, कालीनो सेल एवं एकल भिक्षुकी प्रवाली नगर पालिक  
नियम भोपाल को सूचनार्थ एवं आवश्यक कार्यवाही हेतु ।  
वेब साईट / सर्वे क्लब / अतिरिक्त प्रति ।

संयुक्त संचालक  
नगर तथा ग्राम निवेश, जिला भोपाल

कार्यालय नगर पालिक निगम भोपाल  
कालोनी प्रकोष्ठ (शिवाजी नगर)

क्रमांक 523/का0प्रको0/2008

भोपाल दिनांक 07/11/2008

मेसर्स ब्राइट स्टार इन्फ्रास्ट्रक्चर प्रा लि  
10/1, एल्यूमिनाटावर, शाउथ तुलसीगंज  
इन्दौर।

विषय:-विकास अनुमति विषयक।

संदर्भ:-आपका आवेदन पत्र दिनांक 13.10.2008।

उपरोक्त विषयान्तर्गत संदर्भित पत्र के माध्यम से आपके द्वारा इस कार्यालय से जारी विकास अनुमति क्र. 520 दिनांक 08/10/2008 की कंडिका (10) में उल्लिखित कालोनी का नाम रूचि कालोनी की जगह रूचि लाइफरकेप्स परिवर्तित करने हेतु निवेदन किया गया था।

अपर आ्युक्त महोदय के आदेशानुसार उक्त विकास अनुमति की कंडिका (10) में कालोनी का नाम रूचि कालोनी की जगह परिवर्तित करते हुए "रूचि लाइफरकेप्स" मान्य किया जाता है।

  
प्रमुख  
आयुक्त महोदय  
नगर पालिक निगम भोपाल



# कार्यालय नगर पालिक निगम भोपाल कालोनी के विकास की अनुमति

अनुमति क्रमांक 570

मध्य प्रदेश नगर पालिक निगम अधिनियम 1956/मध्य प्रदेश नगरपालिका अधिनियम 1956 और इसके अन्तर्गत निर्मित मध्य प्रदेश नगरपालिका (कालोनी इन्जिन का रजिस्ट्रीकरण, निर्देशन तथा शर्त) नियम 1998 के अधीन निम्नलिखित शर्तों के अधीन रहते हुए-

श्री/मेसर्स/अध्यक्ष मेसर्स हाइट स्टार इन्फ्रास्ट्रक्चर प्रा.लि.  
निवासी : 10/1, एल्फुविना टावर, साउथ तुकोगज, इन्दौर।  
मोहल्ला : वार्ड नगर भोपाल लहरील हुजूर जिला भोपाल  
खसरा क्रमांक 33/1/1/1, 40, 41/1, 42/2/1/2, 43, 42/43/1/1, 42/43/2/2, 42/43/2/2, 45/1, 45/2, 46/1/ख, 46/2, 48, 114/1/1, 114/1/2, 114/2, 114/3, 115/1, 115/2, 116, 117/1/ख, 117/1/ख, 118/1, 118/2, 119, 121/3/1, 138, 121/2/1, 136, 137/1/2, 137/2, 122-123, 123/2, 123/3, 123/4, 123/5 कुल रकबा 83.36 एकड़ ग्राम जाटखेड़ी के निम्न आदर्शक कालोनी के विकास कार्य प्रारंभ करने की अनुमति प्रदान की जाती है।

- (1) नगर भूमि सीमा अधिनियम तथा विद्यमान 1975 के उल्लेखित प्राकधानी अन्तर्गत सक्षम प्राधिकारी नगर भूमि सीमा से प्राप्त अनापत्ति प्रमाण पत्रों के उल्लेखित शर्तों का पालन करना होगा।
- (2) मध्य प्रदेश नगरपालिका संहिता 1959 के अन्तर्गत भू-व्यवहार की शर्तों का पालन करना होगा।
- (3) मध्य प्रदेश नगरपालिका संहिता 1959 के अन्तर्गत कार्यालय नगर तथा ग्राम निर्देश विभाग से प्राप्त निर्देश क्रमांक 186/एन.पी.39/29/जिला/नया/2007 दिनांक 08/04/2008 की संश्लेषण शर्तों का पालन करना होगा।
- (4) नगर तथा ग्राम निर्देश विभाग द्वारा अनुमोदित मानचित्र का सीमांकन सत्यापन कराकर नगर तथा ग्राम निर्देश से प्राप्त सीमांकन सत्यापन अनुरोध विकास कार्य करना होगा।
- (5) बाह्य विकास जिसका विवरण कालोनी इन्जिन द्वारा प्रस्तुत किया गया है, का विकास उनके द्वारा स्वयं किया जाना अनिवार्य होगा।
- (6) सेप्टिक टैंक से इफ्ल्यूएट को उपयुक्त स्थान पर छोड़ना होगा एवं इसका समन्वय आवश्यकतानुसार आरू पास की कालोनियों के साथ किया जाना आवश्यक होगा।
- (7) रेन वाटर हार्बरिंग प्रावधान अनुसार रेन वाटर हार्बरिंग प्रणाली स्थापित किया जाना अनिवार्य होगा।
- (8) मध्य प्रदेश नगरपालिका (कालोनी इन्जिन का निर्देशन तथा शर्त) नियम 1998 के नियम 12 तहत अन्तर्गत संबंधित शर्तों का पालन कालोनी इन्जिन द्वारा सुनिश्चित किया जाना अनिवार्य होगा।
- (9) नगर निगम से नियमानुसार विधिवत भवन अनुमति प्राप्त करने के उपरान्त ही भवन निर्माण का कार्य प्रारंभ किया जावे।
- (10) मेसर्स हाइट स्टार इन्फ्रास्ट्रक्चर प्रा.लि. की कालोनी का विकास कार्य रुचि कालोनी के नाम से किया जायेगा कोई भी परिवर्तन बाह्य पूर्व अनुमति के ना करें।



नगरपालिका के अधिकारी  
नगरपालिका के अधिकारी  
नगरपालिका के अधिकारी

license

कार्यालय नगर पालिका विभाग भोपाल 310 110  
रजिस्ट्रीकरण प्रभाग-पुन



दिनांक 4/11/2007

रजिस्ट्रीकरण क्रमांक 12.11

मध्य प्रदेश नगरपालिका विभाग अधिनियम, 1956/1957 के अन्तर्गत नगर पालिका अधिनियम, 1961 और उसके अन्तर्गत निर्मित मध्य प्रदेश नगर पालिका (कार्लोनागर) का रजिस्ट्रीकरण निर्देशन तथा शर्तों ) विभाग 1956 के अधीन विनियमित शर्तों के अध्याधीन :-

श्री. श्रीमती/नेसरल शाहदपुर इन्डस्ट्रियल प्रायवेट लिमिटेड

मि. नो. 74 जोन-2 भोपाल नगर भोपाल  
जिला भोपाल तहसील दुबूर

- (1) जो शाहदपुर कार्लोनागर के रूप में रजिस्ट्रीकरण किया जाता है।
- (2) यह पंजीयन नगर विभाग के क्षेत्र तक के लिए है।
- (3) प्रत्येक अतिरिक्त कार्लोनी स्थापना की सुचना को जिला नगर कार्लोनी स्थापना से पूर्व देना होगा।

प्रत्येक कार्लोनी के लिए विभाग अनुमति विनियमित शर्तों को पारन करने में जिनमें अलग से प्रत्येक करना होगी।



कार्य कार्लोनी में भू-उपयोग/पानों का कार्लोनी की स्थापना विभाग से करार की जायता तब ही करार अर्पण या अर्पण करने से करार की जायता तब ही जारी है। कार्लोनी के विभाग की अनुमति निम्नानुसार प्राप्त पर ली जाती है।

TRUE COPY ATTESTED  
H.P. BALBHADRA  
NOTARY & ADVOCATE  
BHOPAL

Signature and stamp of the official.

0124-4019051  
 Kind Attn: Mr. Himanshu Tilwankar



भारत सरकार  
 केंद्रीय भूजल एवं मिट्टी संसाधन विभाग  
 नई दिल्ली-110001  
 Government of India  
 Central Ground Water Authority  
 Ministry of Water Resources

12

CGWA/IND/Proj/2008-498

No.21-4(34)/NCR/CGWA/2008- 1688

Dated: -

To,  
 M/s Brightstar Infrastructure Private Limited  
 10/1, Alumina Tower  
 South Tukoganj  
 Indore (M.P.)

5 DE. 2008

**Sub: -NOC for ground water withdrawal in respect of M/s Brightstar Infrastructure Private Limited, for their residential township project located at Hoshangabad Road, Village Jatkhedi, Phanda Block, Bhopal District, M.P. - reg.**

Sir,

Kindly refer to your letter dated 22-10-2008 on the above-cited subject. Based on recommendations of Regional Director, CGWB, North Central Region, Bhopal vide their office letter No. 1-B/NCR/TS-838 dated 03-11-2008 and further deliberations on the subject, the NOC of Central Ground Water Authority for ground water withdrawal is hereby accorded to M/s Brightstar Infrastructure Private Limited, for their residential township project located at Hoshangabad Road, Village Jatkhedi, Phanda Block, Bhopal District, M.P. The NOC is however subject to the following conditions -

1. The firm may abstract 153 m<sup>3</sup>/day of ground water for domestic uses only through existing two (2) tubewells only. No new/additional ground water abstraction structures to be constructed/utilized for this purpose without prior approval of the CGWA.
2. The ground water shall not be used for construction purpose.
3. All the tubewells to be fitted with water meter by the industry at its own cost and monitoring of ground water abstraction to be undertaken accordingly on regular basis, at least once in a month. The ground water quality to be monitored twice in a year during pre-monsoon and post-monsoon periods.
4. M/s Brightstar Infrastructure Private Limited, shall in consultation with the Regional Director, Central Ground Water Board, North Central Region, Bhopal continue to implement ground water recharge measures to the tune of 192508 m<sup>3</sup>/year for augmenting the ground water resources of the area.

5. The photographs of the recharge structures after completion of the same are to be furnished immediately to the Regional Director, Central Ground Water Board\* North Central Region, Bhopal for verification and under intimation to this office.
6. The firm at its own cost shall continue to execute ground water regime monitoring programme in and around the project area on regular basis through constructed piezometers to keep a close watch on water level trends for taking suitable measures to keep water level under controlled conditions, in consultation with the Central Ground Water Board, North Central Region, Bhopal.
7. The ground water monitoring data in respect of S. No. 3 & 6 to be submitted to Central Ground Water Board, North Central Region, Bhopal on regular basis at least once in a year.
8. The firm shall ensure proper recycling and reuse of wastewater after adequate treatment.
9. Action taken report in respect of S. No. 1 to 8 may be submitted to CGWA within one-year period.
10. The permission is liable to be cancelled in case of non-compliance of any of the conditions as mentioned in S. No. 1 to 9.
11. This NOC is valid for two years from date of issuance of this letter. Upon review of status of compliance of the above conditions after two years, decision for revalidation of approval will be conveyed accordingly.

Yours faithfully

*Ac. [Signature]*  
Member Secretary

Copy for information to:

1. The Superintending Engineer, Madhya Pradesh Pollution Control Board, Paryavaran Parisar, E-5 Sector, Arera Colony, Bhopal-16 (M.P.). This has reference to your letter no. 1600/TK/2000 dated 27-2-2008.
2. The Regional Director, CGWB, North Central Region, Bhopal. This has reference to your letter No. 1-8/NCR/TS-838 dated 03-11-2008.
3. The TS to Chairman, CGWB, NH-IV, Faridabad.

*Ac. [Signature]*  
Member Secretary

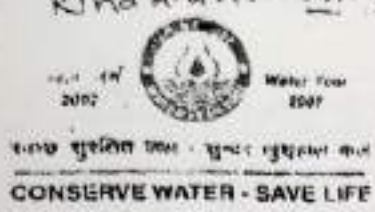
12-15-08 13:40

Voyants

01244019051

0124-4019051  
Kind Attn: Mr. Himanshu Tilwankar

1/2



भारत सरकार  
केन्द्रीय भूजल संसाधन विभाग  
जल संसाधन विभाग  
Government of India  
Central Ground Water Authority  
Ministry of Water Resources

CGWA/IND/Proj/2008-498

No.21-4(34)/NCR/CGWA/2008- 1688

Dated: -  
5 Dec 2008

To,  
M/s Brightstar Infrastructure Private Limited  
10/1, Alumina Tower  
South Tukoganj  
Indore (M.P.)

Sub: -NOC for ground water withdrawal in respect of M/s Brightstar Infrastructure Private Limited, for their residential township project located at Hoshangabad Road, Village Jatkhedi, Phanda Block, Bhopal District, M.P. - reg.

Sir,  
Kindly refer to your letter dated 22-10-2008 on the above-cited subject. Based on recommendations of Regional Director, CGWB, North Central Region, Bhopal vide their office letter No. 1-B/NCR/TS-838 dated 03-11-2008 and further deliberations on the subject, the NOC of Central Ground Water Authority for ground water withdrawal is hereby accorded to M/s Brightstar Infrastructure Private Limited, for their residential township project located at Hoshangabad Road, Village Jatkhedi, Phanda Block, Bhopal District, M.P. The NOC is however subject to the following conditions -

1. The firm may abstract 153 m<sup>3</sup>/day of ground water for domestic uses only through existing two (2) tubewells only. No new/additional ground water abstraction structures to be constructed/utilized for this purpose without prior approval of the CGWA.
2. The ground water shall not be used for construction purpose.
3. All the tubewells to be fitted with water meter by the industry at its own cost and monitoring of ground water abstraction to be undertaken accordingly on regular basis, at least once in a month. The ground water quality to be monitored twice in a year during pre-monsoon and post-monsoon periods.
4. M/s Brightstar Infrastructure Private Limited, shall in consultation with the Regional Director, Central Ground Water Board, North Central Region, Bhopal continue to implement ground water recharge measures to the tune of 192508 m<sup>3</sup>/year for augmenting the ground water resources of the area.

A2 W3 Curzon Road Barracks, Kasturba Gandhi Marg, New Delhi-110001  
CGWA/IND/Proj/2008-498

5. The photographs of the recharge structures after completion of the same are to be furnished immediately to the Regional Director, Central Ground Water Board\* North Central Region, Bhopal for verification and under intimation to this office.
6. The firm at its own cost shall continue to execute ground water regime monitoring programme in and around the project area on regular basis through constructed piezometers to keep a close watch on water level trends for taking suitable measures to keep water level under controlled conditions, in consultation with the Central Ground Water Board, North Central Region, Bhopal.
7. The ground water monitoring data in respect of S. No. 3 & 6 to be submitted to Central Ground Water Board, North Central Region, Bhopal on regular basis at least once in a year.
8. The firm shall ensure proper recycling and reuse of wastewater after adequate treatment.
9. Action taken report in respect of S. No. 1 to 8 may be submitted to CGWA within one-year period.
10. The permission is liable to be cancelled in case of non-compliance of any of the conditions as mentioned in S. No. 1 to 9.
11. This NOC is valid for two years from date of issuance of this letter. Upon review of status of compliance of the above conditions after two years, decision for revalidation of approval will be conveyed accordingly.

Yours faithfully

*Ac. d. 1/11/04*  
Member Secretary

Copy for information to:

1. The Superintending Engineer, Madhya Pradesh Pollution Control Board, Paryavaran Parisar, E-5 Sector, Arera Colony, Bhopal-16 (M.P.). This has reference to your letter no. 1600/TK/2000 dated 27-2-2008.
2. The Regional Director, CGWB, North Central Region, Bhopal. This has reference to your letter No. 1-8/NCR/TS-838 dated 03-11-2008.
3. The TS to Chairman, CGWB, NH-IV, Faridabad.

*Ac. d. 1/11/04*  
Member Secretary



भारत सरकार  
GOVT. OF INDIA  
जल शक्ति मंत्रालय  
MINISTRY OF JAL SHAKTI

जल संसाधन, नदी विकास और गंगा संरक्षण विभाग  
DEPT. OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION

केंद्रीय भूमिजल बोर्ड, उत्तर मध्य क्षेत्र, ब्लॉक-1, चौथी मंजिल, पर्यावास भवन, जेल मार्ग, भोपाल - 462011  
Central Ground Water Board, North Central Region, Block-1 Fourth Floor, Paryavas Bhawan, Jail Road, Bhopal-462011

No.42-1/CGWB/NCR/TS/2024-

1146

Date: 15/7/2024

प्रति/To,

जिला कलेक्टर,

798जे+3एचएफ, ए ब्लॉक सुल्तानिया रोड कोहेफिजा,

पुराना सचिवालय, भोपाल, मध्य प्रदेश 462001

District Collector,

798J+3HF, A Block Sultania Road Kohefiza,

Old Secretariat, Bhopal, Madhya Pradesh 462001

विषय: रुचि लाइफस्केप, जाटखेडी, होशंगाबाद रोड, भोपाल के निवासियों द्वारा अनधिकृत भूजल निकाली के संबंध में शिकायत।

Subject: Complaint regarding unauthorised groundwater abstraction by residents of Ruchi Lifescapes, Jatkhedi, Hosangabad road, Bhopal.

संदर्भ: अपूर्व द्विवेदी, भोपाल से प्राप्त पत्र।

Reference: letter received from Apoorv Dwivedi, Bhopal

महोदय/Sir,

आपको यह अवगत कराया जाता है कि, केंद्रीय भूमि जल प्राधिकरण की अधिसूचना दिनांक 24/9/20 के पैरा नं 10.0 के अंतर्गत जिला कलेक्टर/उपायुक्त ( डी सी ) / जिला मजिस्ट्रेट(डी एम) अनधिकृत भूजल निष्कर्षण संरचनाओं को सील करना, बिजली काटना, एनओसी की शर्तों का उल्लंघन करने वालों के खिलाफ अभियोजन शुरू करना और पर्यावरण क्षतिपूर्ति की कार्यवाही जैसे वाध्यकारी उपायों को करने के लिए अधिकृत है।

You are informed that, under Para No. 10.0 of the notification dated 24/9/20 of the Central Ground Water Authority, the District Collector / Deputy Commissioner (DC) / District Magistrate (DM) are authorized to take enforcement measures like sealing of unauthorized ground water abstraction structures, disconnection of electricity, launching of prosecution against those violating the No Objection Certificate conditions and taking action for imposition of Environmental Compensation

अतः आपको भी अपूर्व द्विवेदी के द्वारा भेजी गयी शिकायत आपके अवलोकन एवं आवश्यक कार्यवाही हेतु भेजी जा रही है।

Therefore, the complaint sent by Mr. Apoorva Dwivedi is being sent to you for your perusal and necessary action.

संवद्ध - उपर्युक्त अनुशात  
enclosure-as above

आपका विश्वासी,

अशोक शिखा  
(अ.कु.विनयाल)  
क्षेत्रीय निदेशक

प्रतिलिपि/Copy to-

1. श्री. अपूर्व द्विवेदी, एनएच-11 रूषि बिजनेस पार्क, होशंगाबाद रोड भोपाल, मध्य प्रदेश, 462026 को सूचनाार्थी Mr. Apoorva Dwivedi, SF-11 Rishi Business Park, Hosangabad Road, Bhopal, M. P. 462026 for information.

अशोक शिखा  
(अ.कु.विनयाल)  
क्षेत्रीय निदेशक

अशोक शिखा

etc



भारत सरकार  
GOVT. OF INDIA

जल शक्ति मंत्रालय

MINISTRY OF JAL SHAKTI

जल संसाधन, नदी विकास और गंगा संरक्षण विभाग

DEPT. OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION

केंद्रीय भूमिजल बोर्ड, उत्तरमध्यप्रदेश, ब्लॉक-1, चौथी मंजिल, पर्यावास भवन, जेल मार्ग, भोपाल - 462011

Central Ground Water Board, North Central Region, Block-1 Fourth Floor, Paryavas Bhawan, Jail Road, Bhopal-462011

File No. 1-8/NCR/TS/SCN/...../207

Dated: 28/10/2024

**कारण बताओ नोटिस**  
**SHOW CAUSE NOTICE**

जहाँ केंद्रीय भूजल प्राधिकरण ने सभी मौजूदा भूजल उपयोगकर्ताओं को भूजल निकासी के लिए कोई आपत्ति प्रमाण पत्र (NOC) प्राप्त करने के लिए आवेदन करने का सार्वजनिक नोटिस जारी किया है, वहीं यह प्राधिकरण के ध्यान में लाया गया है कि "एम/एस ब्राइटस्टार इंफ्रास्ट्रक्चर प्राइवेट लिमिटेड (रुचि लाइफस्केप्स, जाटखेड़ी, होशंगाबाद रोड, भोपाल)" भूजल निकासी के लिए प्राधिकरण से NOC प्राप्त किए बिना भूजल निकाल रहा है। इसलिए, प्राधिकरण पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 5 के तहत अपने अधिकारों का प्रयोग करते हुए आपको निर्देशित करता है कि आप यह बताएं कि आपकी भूजल निकासी संरचना (जैसे कि खुदी हुई कुएं/बोरवेल/ट्यूबवेल/डीवाटरिंग संरचना) को अवैध भूजल निकासी के लिए क्यों न सील किया जाए। आपको इस नोटिस की प्राप्ति की तारीख से 15 दिनों के भीतर स्पष्टीकरण प्रस्तुत करने का अवसर दिया जाता है, अन्यथा प्राधिकरण कानून के अनुसार कार्यवाही करेगा, जिसका जोखिम, लागत और जिम्मेदारी आपकी होगी, जिसमें भूजल निकासी संरचनाओं को सील करना और अवैध भूजल निकासी के लिए पर्यावरणीय मुआवजा लगाना शामिल है।

Whereas the Central Ground Water Authority has issued public notices directing all the existing groundwater users to apply for No Objection Certificate for ground water withdrawal, and whereas, it has been brought to the notice of Authority that "M/S Brightstar Infrastructure Private Limited (Ruchi Lifescapes, Jatkhedhi, Hoshangabad Road, Bhopal)" is withdrawing ground water without obtaining NOC from the Authority. Now therefore, the Authority in exercise of powers under section 5 of the Environment (Protection) Act, 1986 here by directs you to show cause as why your ground water abstraction structure(s) (dug well/bore well/tube well/dewatering structure) should not be sealed for illegal withdrawal of groundwater. You are hereby given an opportunity to submit explanation within 15 days from the date of receipt of this notice, failing which the authority shall proceed in accordance with law, at your own risk, cost and responsibility including sealing of ground water abstraction structures and imposition of environmental compensation for illegal withdrawal of groundwater.

*Chittaranjan Biswal*  
28/10/2024

(पितरंजन बिस्वाल/Chittaranjan Biswal)

कार्यालय प्रमुख/HOO

प्रति/To

एम/एस ब्राइटस्टार इंफ्रास्ट्रक्चर प्राइवेट लिमिटेड (रुचि लाइफस्केप्स, जाटखेड़ी, होशंगाबाद रोड, भोपाल) 10/1, एलुमिना टॉवर, साउथ तुकोगंज, इंदौर, मध्य प्रदेश- 452001

M/S Brightstar Infrastructure Private Limited (Ruchi Lifescapes, Jatkhedhi, Hoshangabad Road, Bhopal)  
10/1, Alumina Tower, South Tukoganj, Indore, Madhya Pradesh- 452001

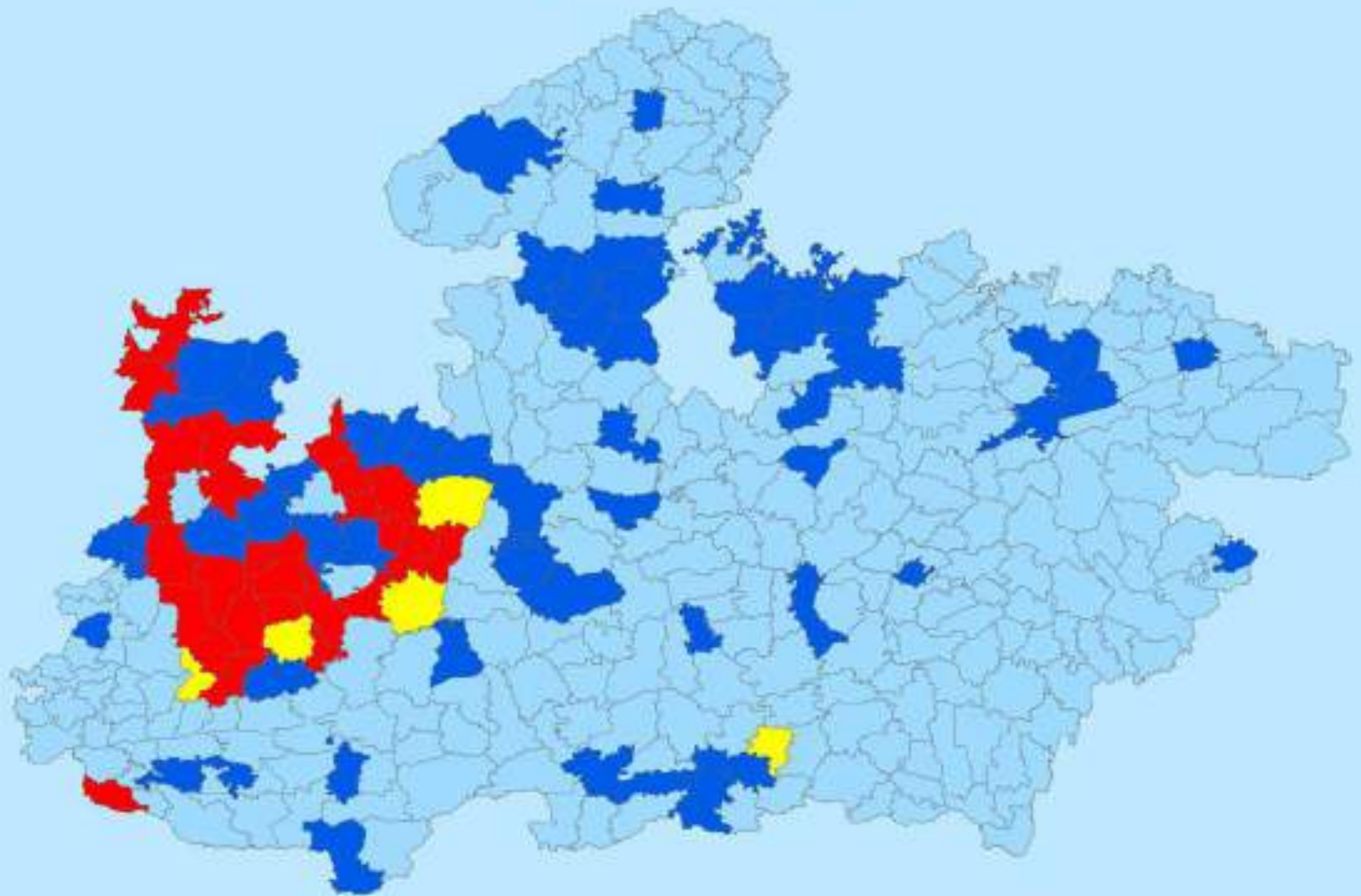
**प्रतिलिपी/Copy To:-**

1. कलेक्टर/उपायुक्त/जिला मजिस्ट्रेट-कलेक्टर, 798जे+3एचएफ, ए ब्लॉक, सुल्तानिया रोड, कोहेफिजा, पुराना सचिवालय, भोपाल (मध्य प्रदेश)  
Collector/Deputy Commissioner /District Magistrate-Collector, 798J+3HF , A Block, Sultanía Road, Kohefiza, Old Secretariat, Bhopal (Madhya Pradesh)- 462001

2. स्टेट्सचलधिष, राज्ठ प्रदूषण नियंत्रण बोर्ड, म.प्र. नियंत्रण बोर्ड ई-5, अरेा कॉलोनी, पर्यावरण भवन, भोपाल (म.प्र.) Member Secretary, State Pollution Control Board, M.P Pollution Control Board E-5 Area Colony Parayavas, Bhawan , Bhopal (M.P)-484001



# **DYNAMIC GROUND WATER RESOURCES OF MADHYA PRADESH (as on 2023)**



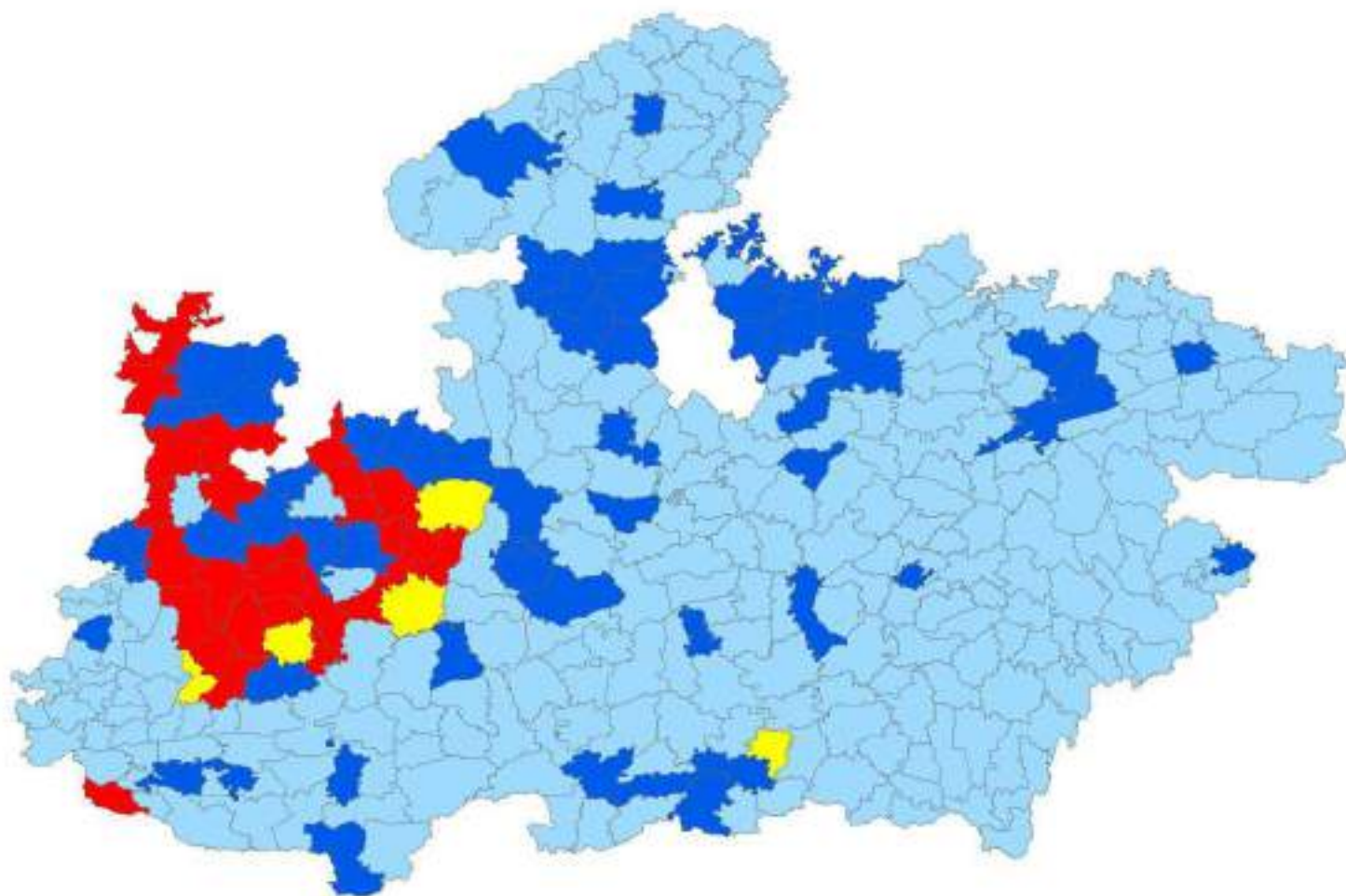
**Central Ground Water Board  
North Central Region, Bhopal  
Department of Water Resources, GR & RD  
Ministry of Jal Shakti  
Government of India**

**Ground Water Survey  
Water Resources Department  
Government of Madhya Pradesh**

**BHOPAL  
SEPTEMBER 2023**



# **DYNAMIC GROUND WATER RESOURCES OF MADHYA PRADESH (as on 2023)**



**Central Ground Water Board  
North Central Region, Bhopal  
Department of Water Resources, GR & RD  
Ministry of Jal Shakti  
Government of India**

**Ground Water Survey  
Water Resources Department  
Government of Madhya Pradesh**

**BHOPAL  
SEPTEMBER 2023**



## FOREWORD

Ground water resources play a vital role in sustaining livelihoods. Its ubiquitous occurrence, reliability and availability in all seasons have made it the primary buffer against drought, playing a pivotal role in ensuring the food security at all levels. Ground water has an important role in meeting the water requirements of agriculture, industrial and domestic sectors in India.

Ground water is annually replenishable resource but its availability is non-uniform in space and time. Hence, the sustainable development of ground water resources warrants precise quantitative assessment based on reasonably valid scientific principles.

National Water Policy, 2002 has also laid emphasis on periodic assessment of ground water resources on scientific basis. The policy also reiterates that the exploitable quantity of ground water should be limited to the amount, which is being recharged annually, more commonly known as "Dynamic Ground Water Resource".

The Dynamic Groundwater Resource Assessment of Madhya Pradesh has been jointly carried out by Ground Water Survey, Water Resource Department, Govt. of Madhya Pradesh and Central Ground Water Board, Govt. of India following the Groundwater Estimation Methodology, 2015 (GEC-2015). This report reveals that the overall stage of ground water extraction is 58.75% in Madhya Pradesh. Out of total 317 assessment units 226 assessment units fall in safe category, 60 assessment units fall under semi critical, 5 in critical and 26 fall in over exploited category.

All computations for the assessment of ground water resources have been automated and done in a GIS environment through a web based application i.e. "INDIA- GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES)" developed by Central Ground Water Board in collaboration with IIT-Hyderabad.

I genuinely appreciate the work done by the officers of Central Ground Water Board and Ground Water Survey, Water Resource Department for their efforts in completing the assessment. I am hopeful that this report will be very useful for the administrators, planners and ground water professionals and will be helpful in ensuring optimal utilization and sustainability of ground water resource.

  
(Manish Singh)

ए. के. बिस्वाल  
क्षेत्रीय निदेशक  
A.K. Biswal  
Regional Director



सत्यमेव जयते



भारत सरकार

जल शक्ति मंत्रालय

जल संसाधन, नदी विकास एवं गंगा संरक्षण मंत्रालय  
केंद्रीय भूमिजल बोर्ड, उत्तर मध्य क्षेत्र, भोपाल

Government of India

Ministry of Jal Shakti

Department of Water Resources, R D & G R

Central Ground Water Board, North Central Region, Bhopal

## PREFACE

The state of Madhya Pradesh is in the process of an accelerated development in the fields of irrigation and industrial activities and ground water occupies a key position in the developmental activities of the state. Although, ground water is a replenishable resource, over extraction of ground water, recurrent droughts, varied monsoon pattern etc., are leading to situation on which several blocks of the state have been categorized as over exploited to Semi-critical.

Assessment of Ground Water Resources of Madhya Pradesh is being done jointly by Central Ground Water Board and Ground Water Survey, Water Resources Department, Government of Madhya Pradesh as per the methodology recommended by the Ground Water Resource Estimation Committee-2015 constituted by the Govt. of India. All the computations for the assessment of Ground Water Resources have been done by a web based application "INDIA-GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES) developed by CGWB in collaboration with IIT-Hyderabad.

The report titled 'Dynamic Ground Water Resources of Madhya Pradesh (as in 2023)' summarizes the results of the assessment, primarily in terms of resource availability, utilization and categorization of assessment units duly approved by the State Level Committee (SLC) constituted for the purpose. The report briefly describes salient features of previous assessments, ground water estimation methodology, rainfall distribution, physiography, geomorphology, land use land cover, drainage and basins hydrogeology, aquifer systems of Madhya Pradesh, ground water level scenario and hydrochemistry of the state in the first three chapters before describing various components of the ground water resource assessment, 2023 in some detail.

I am indebted to Shri Manish Singh, Principal Secretary, Water Resources Department, Government of Madhya Pradesh as well as Chairman of State Level committee for Ground Water Resource Estimation for his valuable guidance in accomplishing task of Ground Water Resource Estimation within the stipulated time frame. I express my sincere thanks to members of committee for approval of the report on "Dynamic Ground Water Resources of Madhya Pradesh (As on 2023)". I am obliged to Shri Shishir Kushwaha, Engineer in Chief, Water Resources Department, Government of Madhya Pradesh, under his supervision the entire work was accomplished. Thanks to Sh. G. P. Soni, Chief Engineer (BODHI), Water Resources Department, Government of Madhya Pradesh and Dr. Jitendra Jain, Superintending Geo-hydrologist, Ground Water Survey, Water Resources Department, Government of Madhya Pradesh for co-coordinating the work at state level.

A deep sense of gratitude is expressed to all the state Officers of Ground Water Survey, Water Resources Department, Government of Madhya Pradesh, who was associated with this work at one stage or the other.

I wish to place on record my appreciation of the untiring efforts of Sh. Chitaranjan Biswal, Scientist-C and the team of officers of Central Ground Water Board, North Central Region, Bhopal for completing the challenging task of Resource Assessment and compiling this informative report.

I hope that, this report will be useful to all the user agencies engaged in planning and development of ground water in the state.



Water is elixir of life

(A.K. Biswal)

पर्यावास भवन, ब्लॉक-1, चौथा तल, अरेरा हिल्स, जेल रोड, भोपाल-462011,  
फोन : 0755-2557639, 2525201, 2760090, ई-मेल : rdncr-cgwb@nic.in, वेब साइट : www.cgwb.gov.in  
Paryavas Bhawan, Block 1, 4th Floor, Arera Hills, Jail Road, Bhopal-462 011  
Ph. 0755-2525201, 2557639, 2760090, E-mail : rdncr-cgwb@nic.in, Websites : www.cgwb.gov.in

**DYNAMIC GROUND WATER RESOURCES OF MADHYA PRADESH, 2023**

**AT A GLANCE**

1. Total Annual Ground Water Recharge (BCM)	: 35.47
2. Annual Extractable Ground Water Resource (BCM)	: 32.85
3. Annual Ground Water Extraction (BCM)	: 19.30
4. Stage of Ground Water Extraction (%)	: 58.75

**CATEGORISATION OF ASSESSMENT UNITS**

(Blocks/ Urban Areas)

S. N.	Category	Assessment Units		Annual Extractable Ground Water Resource		Recharge Worthy Area	
		Number	%	MCM	%	Sq KM	%
1	Safe	226	71.29	22773	69.32	190726	70.81
2	Semi-Critical	60	18.93	6120	18.63	51804	19.23
3	Critical	5	1.58	537	1.63	4249	1.58
4	Over-Exploited	26	8.20	3424	10.42	22555	8.37
5	Saline	0	0	0	0	0	0
<b>Total</b>		<b>317</b>		<b>32854</b>		<b>269334</b>	

## **C O N T E N T S**

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	PREFACE	
	AT A GLANCE	
	EXECUTIVE SUMMARY	
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1.2	Re-assessment of Ground Water Resources,2023	3
1.3	Proceedings of Resource Estimation	3
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## **EXECUTIVE SUMMARY**

Dynamic Ground Water Resources Assessment is carried out at periodical intervals jointly by Central Ground Water Board, North Central Region, Bhopal and Ground Water Survey, Water Resource Department, Govt. of Madhya Pradesh under the guidance of State Level Committee and under the overall supervision of Central Level Expert Group. Such joint exercises have been taken up earlier in 1980, 1995, 2004, 2009, 2011, 2013, 2017 2020 and 2022.

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/ Urban areas) 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 after 2017, assessments are 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 76 % of the total annual ground water recharge. A major part of the state receives rainfall mainly during SW Monsoon season spread over the months of mid-June to September. Over 99 % of the annual rainfall is received in the four rainy months for June to September only thereby leading to large variations on temporal scale.

Type of rock formations and their storage and transmission characteristics have a significant influence on ground water recharge. Ground water occurrence in the Hard rock formations which are occupying nearly 80% of the total geographical area of the state, are forming poor aquifers. Porous formations such as the alluvial formations in the Bhind (Chambal basin), Hoshangabad and Narsimhapur districts (Narmada basin) and also in Sheopur, Morena, Datia, Chhatarpur, Jabalpur, Katni, Khandwa, Burhanpur, Raisen, Sidhi and Balaghat districts and along rivers in some other districts on the other hand generally have high specific yields and are good repositories of ground water.

In the present assessment, the total annual ground water recharge has been assessed as 35.47 bcm. Keeping an allocation for natural discharge, the annual extractable ground water resource works out as 32.85 bcm. The total annual ground water extraction (as in 2023) has been assessed as 19.30 bcm. The average stage of ground water extraction for the state as a whole works out to be about 58.75%. The extraction of ground water for various uses in

different parts of the state is not uniform. Out of the total 317 assessment units (Blocks/ Urban areas) in the state, 26 units (8%) have been categorized as 'Over-Exploited' indicating Ground Water extraction exceeding the total Annual Extractable Resources. A total of 5 (2%) assessment units have been categorized as 'Critical', where the stage of ground water extraction is between 90-100 % of annual extractable resources available. There are 60 'Semi-Critical' units (19%), where the stage of ground water extraction is between 70 % and 90 % and 226 (71%) assessment units have been categorized as 'Safe', where the stage of Ground water extraction is less than 70 %. Out of 32853.75 mcm of Total Annual Extractable Resources of the state, 3424.26 mcm (10.42 %) are under 'Over-Exploited', 537.1 mcm (1.63 %) are under 'Critical', 6119.62 mcm (18.63 %) are under 'Semi-Critical', 22772.77 mcm (69.32 %) are under 'Safe' category assessment units. Out of 269333.27 Sq Km of Recharge worthy area of the state, 22554.86 Sq Km (8.37 %) are under 'Over-Exploited', 4249.07 Sq Km (1.58 %) are under 'Critical', 51803.76 Sq Km (19.23 %) are under 'Semi-Critical', 190725.58 Sq Km (70.81%) are under 'Safe' category assessment units.

The total annual ground water recharge has increased from 35.24 to 35.47 bcm. The rise in groundwater recharge can be attributed to increased rainfall recharge and the implementation of water conservation structures. Accordingly, the annual extractable resource of Ground Water Resource Assessment, 2023 on comparison Ground Water Resource Assessment, 2022 shows an increase from 32.58 to 32.85 bcm. The groundwater extraction has increased from 19.25 to 19.30 bcm and the changes are attributed mainly to due to increase in the abstraction structures and increase in population. The overall stage of groundwater extraction has increased from 59.10% to 58.75%.

Almost all over-exploited assessment units falling in western part of Madhya Pradesh, which is known as "MALWA AREA" where ground water extraction has increased many folds during past decades. District wise analysis of data of annual extractable resource and annual ground water extraction indicate that four districts namely Indore, Mandasaur, Neemuch, Ratlam and Shajapur are districts where stage of ground water extraction is more than 100% as a whole.

# **CHAPTER 1**

## **1.0 INTRODUCTION**

Water is a fundamental resource for life. Sustainable development and efficient management of this scarce resource has become a challenge in Madhya Pradesh. Increasing population, growing urbanization and rapid industrialization combined with the need for raising agricultural production generates competing demands for water. Ground water has steadily emerged as the backbone of state agriculture and drinking water security. 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.

Agriculture is the main stay of the people of Madhya Pradesh. Water is essential for irrigation purposes, but its indiscriminate use can lead not only to shortages, but also to the deterioration of crop yields and soils. The impact of over extraction on dynamic resources of ground water resources is noticed in many places in Madhya Pradesh especially in western part called Malwa region. In these areas depletion of water levels, drying of wells and ground water quality problems are reported. The State has varied hydrogeological characteristics due to which ground water potential varies from place to place. Increasing urbanization and growing dependence on ground water for irrigation in the state has called for judicious and planned uses of ground water resources.

The dynamic ground water refers to the quantity of ground water available in the zone of water level fluctuation, which is active recharge zone and replenished annually. In addition to the dynamic ground water resource, there exists a limited ground water reservoir in the deeper zones below the active recharge zone and in the confined aquifers in Madhya Pradesh. The ground water exploitation primarily confines in the shallow aquifer. The sustainability of shallow aquifers plays an important role for the development of ground water structures. The sustainable development of ground water resources, therefore, warrants precise quantitative assessment of dynamic ground water resources based on the reasonably valid scientific principles.

## **1.1 PREVIOUS ASSESSMENTS**

Ground Water Resources Estimation of the country was done for the first time in the year 1979. A committee known as Ground Water Over Exploitation Committee was constituted by

Agriculture Refinance and Development Corporation (ARDC) of Government of India Based on the methodology and norms recommended by the above committee ground water resources were assessed. Subsequently, necessity was felt to refine the methodologies and the “Ground Water Estimation Committee (GEC)” headed by the Chairman, CGWB came into existence. Based on the detailed Surveys and Studies carried out by the different Regions and Projects of CGWB, the committee recommended the revised methodology in 1984 (GEC- 84) for estimation of ground water resources.

Again in year 1997, Ground Water Estimation Committee revised its methodology and suggested the modified methodology for computation of ground water resource estimation, which was refined on the basis of studies of State Government agencies and CGWB. Based on GEC 1997, the dynamic ground water resources of Madhya Pradesh have been estimated for the state 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. Salient details of status of ground water resources and categorization of assessment units in 2011, 2013, 2017, 2020, 2022 and 2023 are shown in **Table 1.1** and **Table1.2** respectively.

**Table 1.1: Ground Water Resources Assessment 2011 to 2023**

S. N	Ground Water Resources Assessment	2011	2013	2017	2020	2022	2023
1	Annual Ground Water Recharge (bcm)	35.04	35.98	36.42	36.16	35.24	35.47
2	Annual Extractable Ground Water Resource (bcm)	33.29	34.16	34.47	33.38	32.58	32.85
3	Total Ground Water Extraction (bcm)	18.83	19.36	18.88	18.97	19.25	19.30
4	Stage of Ground Water Extraction (%)	57	56.68	54.76	56.82	59.1	58.75

**Table 1.2: Categorization of Assessment units from 2009 to 2023**

S N	Categorization	2011	2013	2017	2020	2022	2023
1	Total Assessed units	313	313	313	317	317	317
2	Safe	218	228	240	233	226	226
3	Semi-critical	67	58	44	50	60	60
4	Critical	4	2	7	8	5	5
5	Over-Exploited	24	25	22	26	26	26
6	Saline	0	0	0	0	0	0

## 1.2 RE-ASSESSMENT OF GROUND WATER RESOURCES, 2023

The assessment of Ground water resources is carried out to determine the prevailing status of ground water resources in the state. It also helps assess the impact of the on-going ground water management practices on the groundwater resources. In 2022, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti 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 2022. 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 2023. A copy of the Government Resolution is in **Appendix A**.

Ground water resources assessment for reference year 2023 in Madhya Pradesh have been carried out jointly by Central Ground Water Board (CGWB), North Central Region, Bhopal in association with Ground Water Survey, Water Resources Department, Government of M.P. under the supervision of State Level Committee (**Appendix B**), with technical guidance from Central Level Expert Group. The assessment carried out was approved by the State Level Committee (**Appendix E**). Based on the assessments the Report titled “Dynamic Ground Water Resources of Madhya Pradesh-2023” has been compiled. The report briefly describes salient features of previous assessments, ground water estimation methodology, rainfall distribution, physiography, geomorphology, land use land cover, drainage and basins hydrogeology, aquifer systems of Madhya Pradesh, ground water level and ground water quality scenario, and various components of the ground water resource assessment, 2023 in detail.

The report was reviewed and deliberated upon during the meeting of CLEG held on 27.09.2023, and was approved.

## 1.3 PROCEEDINGS OF THE RESOURCE ESTIMATION

A permanent State Level Technical Committee was constituted for approval of Ground Water Resources of Madhya Pradesh under the Chairmanship of Principal Secretary, Water Resources Department, Government of M.P. vide Memo No. F-15-21/Minor/31/290 dated 10.02.2022 for the assessment 2020-21 (**Appendix B**). The structure of Committee was with following nominees of different departments:

- |   |   |          |
|---|---|----------|
| 1 | Principal Secretary, Water Resources Department, Government of M.P. | Chairman |
| 2 | Commissioner, Urban Development and Housing Department              | Member   |
| 3 | Commissioner, MGNREGA, Bhopal                                       | Member   |
| 4 | Director, Rajiv Gandhi Water Shed Mission                           | Member   |

5	General Manager, NABARD, Bhopal	Member
6	Engineer -in - Chief, Water Resources Department	Member
7	Engineer -in - Chief, Public Health Engineering Department	Member
8	Engineers -in - Chief, RES	Member
9	Director, Agriculture, Government of M.P.	Member
10	Director, Industries, Government of M.P.	Member
11	Director, Directorate Geology and Mining, Bhopal	Member
12	Chief Engineer, BODHI, Water Resources Department	Member
13	Superintending Geo-Hydrologist, GWSC, Circle Bhopal	Member
14	Regional Director, CGWB, NCR, Bhopal	Member Secretary

A Ground water assessment cell was constituted under guidance of Sh. M. S Dabar, Engineer in Chief, Water Resources Department, Govt. of M.P. and Sh A. K. Biswal, Regional Director, CGWB, NCR, Bhopal for the estimation.

First State Level Committee meeting was held on 19.04.2023 under the Chairmanship of Sh. S N Mishra, Additional Chief Secretary, Water Resources Department, Govt. of Madhya Pradesh. In the meeting Sh. Chittaranjan Biswal, Scientist-B, CGWB, NCR, Bhopal explained the overview of Ground Water Resource estimation, strategic plan, status of various activities related to Dynamic Ground Water Resource Estimation. The data will be provided by all the line departments by 31<sup>st</sup> July, 2023 and all attempts will be made to complete the Dynamic Groundwater resource estimation by the end of August 2022. The minutes of the meeting and the list of participants is enclosed as **Appendix D**.

Thereafter, the Groundwater resource estimation work was taken up jointly by CGWB, NCR, Bhopal and State Groundwater Survey, WRD under the supervision of Sh. A. K Biswal, Regional Director, CGWB, NCR, Bhopal, Sh. Shishir Kushwaha, Engineer in Chief and Sh. G. P. Soni, Chief Engineer (BODHI), Water Resources Department, Govt. of M.P and. The exercise was done through IN-GRES (India-Groundwater Resource Estimation System), a software solution developed by CGWB in collaboration with IIT-Hyderabad for the purpose of Resource Estimation Automation. Virtual as well as hands on training programs were conducted by CGWB showcasing INGRES features, data upload, trigger computations and approve the results. Sh. Chitta Ranjan Biswal, Scientist 'C', CGWB, NCR, Bhopal provided necessary guidance for computation of Groundwater Resource works and reconciliation of the entire exercises. Dr. Jitendra Jain, Superintending Engineer from Ground Water Survey, Water Resource Department coordinated and monitored the progress of the works done by officers of Ground Water Survey. The data uploaded in INGRES software by Officers of State Ground

Water Survey were checked, validated and discrepancies noticed were corrected under the direction of Sh. Chittaranjan Biswal, Scientist 'C', CGWB, NCR, Bhopal.

Second State level meeting was held on 17.08.2023 under the Chairmanship of Sh. Manish Singh, Principal Secretary, Water Resources Department, Govt. of Madhya Pradesh. Sh. Chittaranjan Biswal, Scientist 'C', CGWB, NCR, Bhopal presented the gist on Dynamic Ground Water Resource Assessment 2023. The resources were discussed thoroughly by the members of the committee and after discussion the Dynamic Ground Water Resource of Madhya Pradesh of 2023 was approved. The minutes of the meeting and the list of participants is enclosed as **Appendix F**.

After approval from the state level committee the Dynamic Groundwater Resource got approved from Central level Expert Group on 27.09.2023. The National Compilation on Dynamic Ground Water Resource Estimation 2023 of India got approved from the Ministry of Jal Shakti on 01.12.2023. After approval from Ministry, the report of Dynamic Groundwater Resource of Madhya Pradesh 2023 was prepared by Sh. Chittaranjan Biswal Scientist 'B', CGWB, NCR, Bhopal under the guidance of Sh. A. K. Biswal, Regional Director, CGWB, NCR, Bhopal.

## **CHAPTER 2**

### **2.0 GROUND WATER RESOURCE ESTIMATION METHODOLOGY**

Ground water resource as in 2023 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:

The methodology recommends aquifer wise ground water resource assessment of both the Groundwater resources components, i.e., Replenish able ground water resources or Dynamic GroundWater Resources and In-storage Resources or Static Resources. Wherever the aquifer geometry has not been firmly established for the unconfined aquifer, the in-storage ground water resources have to be assessed in the alluvial areas down to the depth of bed rock or 300 m, whichever is less. In case of hard rock aquifers, the depth of assessment would be limited to 100 m. In case of confined aquifers, if it is known that groundwater extraction is being done from this aquifer, the dynamic as well as in-storage resources are to be estimated. If it is firmly established that there is no ground water extraction from this confined aquifer, then only in-storage resources of that aquifer has to be estimated. Until aquifer geometry is established on appropriate scale, the existing practice of using watershed in hard rock areas and blocks/mandals/ firkas in soft rock areas may be continued.

It is also pertinent to add that as it is advisable to restrict the groundwater development as far as possible to annual replenish able resources, the categorization also takes into account 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 of time. 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.

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

$$\text{Inflow} - \text{Outflow} = \text{Change in Storage (of an aquifer)} \dots\dots\dots (1)$$

Equation (1) can be further elaborated as –

$$\Delta S = RRF + RSTR + RC + RSWI + RGWI + RTP + RWCS \pm VF \pm LF - GE - T - E - B \quad (2)$$

Where,

- $\Delta S$  - Change in storage
- RRF –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
- RTP - 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

It is preferred that all the components of water balance equation should be estimated in an assessment unit. Due to lack of data for all the components in most of the assessment units, it is proposed that at present the water budget may be restricted to the major components only, taking into consideration certain reasonable assumptions. The estimation is to be 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 Rainfall Recharge

It is recommended that ground water recharge should be estimated on ground water level fluctuation and specific yield approach since this method takes into account the response of ground water levels to ground water input and output components. This, however, requires adequately spaced representative water level measurement for a sufficiently long period. It is proposed that there should be at least three spatially well distributed observation wells in the assessment unit, or one observation well per 100 sq. Km. Water level data should also be

available for a minimum period of 5 years (preferably 10 years), along with corresponding rainfall data. Regarding frequency of water level data, two water level readings, during pre and post monsoon seasons, are the minimum requirement. It would be ideal to have monthly water level measurements to record the peak rise and maximum fall in the ground water levels. In units or subareas where adequate data on ground water level fluctuations are not available as specified above, ground water recharge may be estimated using rainfall infiltration factor method only. The rainfall recharge during non-monsoon season may be estimated using rainfall infiltration factor method only.

### 2.1.1.1 Ground Water Level Fluctuation Method

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

$$\Delta S = RRF + RSTR + RSWI + RGWI + RTP + RWCS \pm VF \pm LF - GE - T - E - B \dots\dots\dots(3)$$

Where,

- $\Delta S$  - Change in storage
- $RRF$  - Rainfall recharge
- $RSTR$  - Recharge from stream channels
- $RSWI$  - Recharge from surface water irrigation
- $RGWI$  - Recharge from ground water irrigation
- $RTP$  - Recharge from Tanks & Ponds
- $RWCS$  - 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 will have another term i.e., Recharge due to canals ( $R_C$ ) and the equation will be as follows:

$$\Delta S = RRF + RSTR + R_C + RSWI + RGWI + RTP + RWCS \pm VF \pm LF - GE - T - E - B \dots\dots(4)$$

A couple of important observations in the context of water level measurement must be followed. It is important to bear in mind that while estimating the quantum of ground water extraction, the depth from which ground water is being extracted should be considered. One should consider only the draft from the same aquifer for which the resource is being estimated. The change in storage can be estimated using the following equation:

$$\Delta S = \Delta h \times A \times SY \dots \dots \dots (5)$$

Where,

$\Delta S$  - Change in storage

$\Delta h$  - rise in water level in the monsoon season

A - Area for computation of recharge

S<sub>Y</sub> - Specific Yield

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

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

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

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 is to be normalized for the normal monsoon season rainfall as per the procedure indicated below.

**Normalization of Rainfall Recharge**

Let R<sub>i</sub> be the rainfall recharge and r<sub>i</sub> 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<sub>i</sub> 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<sub>i</sub> and r<sub>i</sub> have been obtained as described above, a normalization procedure is to be 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 normalization procedure. The first method is based on a linear relationship between recharge and rainfall of the form

$$R = ar \dots \dots \dots (8)$$

Where,

R =Rainfall recharge during monsoon season

r = Monsoon season rainfall

a = a constant

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

$$R_{RF}(Normal) = \frac{\sum_{i=1}^N [R_i \frac{r (Normal)}{r_i}]}{N} \dots \dots \dots (9)$$

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,

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

Where,

- $RF$ (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 to be followed in the second method is as given below:

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

$$b = \frac{S_2 - aS_1}{N} \dots \dots \dots (12)$$

Where,

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

**2.1.1.2 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, it is recommended to compare the rainfall recharge obtained from water level fluctuation approach with that estimated using rainfall infiltration factor method. Recharge from rainfall is estimated by using the following relationship –

$$= RFIF \times A \times \frac{R-a}{1000} \dots \dots \dots 13$$

Where,

A - Area in hectares

$R_{RF}$  - Rainfall recharge in ham

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 to be 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. It is suggested that 10% of Normal annual rainfall may be taken as minimum rainfall threshold and 3000 mm as maximum rainfall limit. While computing the rainfall recharge, 10% of the normal annual rainfall is to be deducted from the monsoon rainfall and balance rainfall would be considered for computation of rainfall recharge. The same recharge factor may be used for both monsoon and non-monsoon rainfall, with the condition that the recharge due to non-monsoon rainfall may be 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 may be estimated for normal rainfall, based on recent 30 to 50 years of data.

**2.1.1.3 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 have to be 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

$$PD = \frac{R_{RF}(\text{normal,wtfm}) - R_{RF}(\text{normal,rif m})}{R_{RF}(\text{normal,rif m})} \times 100 \dots \dots \dots (14)$$

Where,

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

$R_{RF}(\text{normal, rifm})$  = 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.

### 2.1.2 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 as follows.

**Table.2.1: Recharge from other sources formula**

S N.	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
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

S N.	Source	Estimation Formula	Parameters
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

### 2.1.3 Evaporation and Transpiration

Evaporation can be estimated for the aquifer in the assessment unit if water levels in the aquifer are within the capillary zone. It is recommended to compute the evaporation through field studies. If field studies are not possible, for areas with water levels within 1.0mbgl, evaporation can be 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 should be taken as zero.

Transpiration through vegetation can be estimated if water levels in the aquifer are within the maximum root zone of the local vegetation. It is recommended to compute the transpiration through field studies. Even though it varies from place to place depending on type of soil & vegetation, in the absence of field studies the following estimation can be followed. If water levels are within 3.5m bgl, transpiration can be estimated using the transpiration rates available for other areas. If it is greater than 3.5m bgl, the transpiration should be taken as zero.

For estimating evapotranspiration, field tools like Lysimeters can be used to estimate actual evapotranspiration. Usually agricultural universities and IMD carry out lysimeter experiments and archive the evapotranspiration data. Remote sensing based techniques like SEBAL (Surface Energy Balance Algorithm for Land) can be used for estimation of actual evapotranspiration. Assessing offices may apply available lysimeter data or other techniques for estimation of evapotranspiration. In case where such data is not available, evapotranspiration losses can be empirically estimated from PET data provided by IMD.

### 2.1.4 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.

### 2.1.5 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.

### 2.1.6 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 to be computed for all the sub units available in the assessment unit.

### 2.1.7 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.

The ground water base flow contribution limited to the ecological flow of the river should be determined which will be deducted from Annual Ground Water Recharge to determine Annual Extractable Ground Water Resources (EGR). The ecological flows of the rivers are to be determined in consultation with Central Water Commission and other concerned river basin agencies. In case base flow contribution to the ecological flow of rivers is not determined then following assumption is to be followed.

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, present practice (GEC 1997) of allocation of unaccountable natural discharges to 5% or 10% of annual recharge may be retained. If the rainfall recharge is assessed using water level fluctuation method this will be 5% of the annual recharge and if it is assessed using rainfall infiltration factor method, it will be 10% of the annual recharge. The balance will account for Annual Extractable Ground Water Resources (EGR).

### 2.1.8 Estimation of Ground Water Extraction

Ground water draft or extraction is to be assessed as follows.

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

Where,

- GE<sub>ALL</sub> = Ground water extraction for all uses
- GE<sub>IRR</sub> = Ground water extraction for irrigation
- GE<sub>DOM</sub> = Ground water extraction for domestic uses
- GE<sub>IND</sub> = Ground water extraction for industrial uses

**2.1.8.1 Ground Water Extraction for Irrigation (GE<sub>IRR</sub>)**

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.

**2.1.8.2 Ground Water Extraction for Domestic Use (GE<sub>DOM</sub>)**

There are several methods for estimation of extraction for domestic use (GE<sub>DOM</sub>). 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.

$$G_{DO} = \text{Population} \times \text{Consumptive Requirement} \times L_g \dots\dots\dots (16)$$

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.

**2.1.8.3 Ground Water Extraction for Industrial Use (GE<sub>IND</sub>)**

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.

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

Where,

$$L_g = \text{Fractional load on ground water for industrial water supply.}$$

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.

**2.1.9 Stage of Ground Water Extraction**

The stage of ground water extraction is defined by.

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

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.

**2.1.10 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.

**Table.2.2: Validation of Stage of Ground Water Extraction**

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

**2.1.11 Categorization of Assessment Unit**

As emphasized in the National Water Policy, 2012, a convergence of Quantity and Quality of ground water resources is required while assessing the ground water status in an assessment unit. Therefore, it is recommended to separate estimation of resources where water quality is beyond permissible limits for the parameter salinity.

**2.1.12 Categorization of Assessment Unit**

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

**Table.2.3: Categorization of Assessment Unit**

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

**2.1.13 Allocation of Ground Water Resource for Utilization**

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 has to be based on population as 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 is recommended.

$$Alloc = 22 \times N \times L_g \text{ mm per year} \dots \dots \dots (19)$$

Where,

Alloc = Allocation for domestic water requirement

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

L<sub>g</sub> = fractional load on ground water for domestic water supply (≤ 1.0)

In deriving equation (19), it is assumed that the requirement of water for domestic use is 60 lpd per head. The equation can be suitably modified in case per capita requirement is different. If by chance, the estimation of projected allocation for future domestic needs is less than the current domestic extraction due to any reason, the allocation must be equal to the present day extraction. It can never be less than the present day extraction as it is unrealistic.

#### **2.1.14 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 should be 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 will be zero.

## **2.2 GROUND WATER ASSESSMENT 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 it is recommended to use the difference of the actual demand and the supply by surface water sources as the withdrawal from the ground water resources.
- 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, it is proposed to use 30% of the rainfall infiltration factor proposed 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 is also to be included in the other resources and the recharge may be estimated. The percent losses may be collected from the individual water supply agencies, 50% of which can be taken 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 may be 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 can be used on the quantum of flash floods to estimate the recharge from the flash floods. Even when the drainage system is open channels, till further documented field studies are done same procedure may be followed.
- It is proposed to have a separate ground water assessment for urban areas with population more than 10 lakhs.
- Wherever, the pre monsoon and post monsoon water levels are above mean sea level the dynamic component of the estimation will be same as other areas.
- If both these water levels are below sea level, the dynamic component should be taken as zero.
- Wherever, the post monsoon water table is above sea level and pre monsoon water table is below sea level the pre monsoon water table should be taken as at sea level and fluctuation is to be computed.
- The static or in storage resources are to be restricted to the minimum of 40 times the pre monsoon water table or the bottom of the aquifer.

### **2.3 NORMS TO BE USED IN THE ASSESSMENT**

The committee recommends that the state agencies should be encouraged to conduct field studies and use these computed norms in the assessment. For conducting field studies, it is recommended to follow the field-tested procedures for computing the norms. There is the possibility of error creeping in at various levels in the field study and hence the committee is of the opinion to give a maximum and minimum values for all the norms used in the estimation. The committee can foresee the handicap of the state agencies which are not able to compute the norms by their own field study. In such cases, it suggests an average of the range of norms to be used as the recommended value for the norm.

### 2.3.1 Specific Yield

Recently under Aquifer Mapping Project, Central Ground Water Board has classified all the aquifers into 16 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 2.4** may be followed in the future assessments. The Major aquifer map can be obtained from Regional offices of Central Ground Water Board.

The recommended Specific Yield values are to be used for assessment, unless sufficient data based on field studies are available to justify the minimum, maximum or other intermediate values. The Norms suggested below are nothing but the redistribution of norms suggested by GEC-1997 methodology and hence people are encouraged to conduct field studies and strengthen the Norms database.

**Table 2.4: Norms Recommended for Specific Yield**

S.N.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Min (%)	Max (%)
		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

S.N.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Min (%)	Max (%)
		Code	Name				
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 to Cenozoic	3	1	5
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	Karstified Miliolitic 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
	Limestone	LS03	Karstified Limestone/Dolomite	Proterozoic	10	5	15

S.N.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Min (%)	Max (%)
		Code	Name				
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	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 Proterozoic	1.5	1	2
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

S.N.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Min (%)	Max (%)
		Code	Name				
50	Khondalite	KH01	Khondalites, Granulites - Massive, 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
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

### 2.3.2 Rainfall Infiltration Factor

It is recommended that to assign Rainfall Infiltration Factor values to all the aquifer units recently classified by the Central Ground Water Board. The values recommended in **Table 2.5** may be followed in the future assessments. The recommended Rainfall Infiltration Factor values are to be used for assessment, unless sufficient data based on field studies are available to justify the minimum, maximum or other intermediate values.

An additional 2% of rainfall recharge factor may be used in such areas or parts of the areas where watershed development with associated soil conservation measures are implemented. This additional factor is subjective and is separate from the contribution due to the water conservation structures such as check dams, nalla bunds, percolation tanks etc. The norms for the estimation of recharge due to these structures are provided separately. This additional factor of 2% is at this stage, only provisional, and will need revision based on pilot studies.

The Norms suggested below are nothing but the redistribution of norms suggested by GEC-1997 methodology and hence people are encouraged to conduct field studies and strengthen the Norms database.

**Table 2.5: Norms Recommended for Rainfall Infiltration Factor**

S.N.	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 to Cenozoic	7	6	8

S.N.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
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
25	Limestone	LS01	Miliolitic Limestone	Quaternary	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

S.N.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
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
50	Khondalite	KH01	Khondalites, Granulites - Massive, 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	Ulra Basics (Epidiorite, Granophyre etc.) - Weathered, Jointed	Proterozoic to Cenozoic	7	6	8
62	Intrusive	IN02	Ulra Basics (Epidiorite, Granophyre etc.) - Massive, Poorly Fractured	Proterozoic to Cenozoic	2	1	3

### 2.3.3: Norms for Canal Recharge

Unlike other norms, the Recharge factor for calculating recharge due to canals is given in two units viz. ham/million m<sup>2</sup> of wetted area/day and cumecs per million m<sup>2</sup> of wetted area. As all

other norms are in ham, the committee recommends the norm in ham/million m<sup>2</sup> of wetted area for computing the recharge due to canals.

There is a wide variation in the values of the recharge norms proposed by GEC 1997. The Canal seepage norm is approximately 150 times the other recharge norms. In the absence of any field studies to refine the norms it is decided by the committee to continue with the same norms. The committee strongly recommends that each state agency must conduct one field study at least one in each district before completing the first assessment using this methodology. The committee also suggests a recommended value and minimum and maximum values as in the case of other norms. Where specific results are available from case studies in some states, the adhoc norms are to be replaced by norms evolved from these results.

The Norms suggested in **Table 2.6** below are nothing but the rationalization and redistribution of norms suggested by GEC-1997 methodology and hence people are encouraged to conduct field studies and strengthen the Norms database.

**Table 2.6: 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 some clay content along with sand	17.5	15	20
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

### 2.3.4 Norms for Recharge Due to Irrigation

The Norms Suggested by GEC-1997 gives for only three ranges of water levels and it creates a problem in the boundary conditions. For instance, as a result of the variation in water level from 24.9 to 25.1m bgl in the adjoining blocks, change occurs in the return flow from irrigation in the range of 10% to 15%. Hence to reduce the discrepancy it is recommended to have linear relationship of the norms in between 10m bgl water level and 25m bgl water level. It is proposed to have the same norm of 10m bgl zone for all the water levels less than 10m. Similarly, the norm recommended for 25m may be used for the water levels more than 25m as well. The Recommended Norms are presented in **Table 2.7**.

For surface water, the recharge is to be estimated based on water released at the outlet. For

ground water, the recharge is to be estimated based on gross draft. Where continuous supply is used instead of rotational supply, an additional recharge of 5% of application may be used. Where specific results are available from case studies in some states, the adhoc norms are to be replaced by norms evolved from these results.

**Table 2.7: 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

### 2.3.5 Norms for Recharge due to Tanks & Ponds

As the data on the field studies for computing recharge from Tanks & Ponds are very limited, it is recommended to follow the same norm as followed in GEC 1997 in future assessments also. Hence the norm recommended by GEC-2015 for Seepage from Tanks & Ponds is 1.4 mm / day.

### 2.3.6 Norms for Recharge due to Water Conservation Structures

Even though the data on the field studies for computing recharge from Water Conservation Structures are very limited, it is recommended that the Recharge from the water conservation structures is 40% of the Gross Storage based on the field studies by Non-Government Organizations. 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.

### 2.3.7 Norm for Per Capita Requirement

As the option is given to use the actual requirement for domestic needs, the Requirement Norm recommended by the committee is 60 lpcd for domestic needs. This can be modified if the actual requirement is known.

### 2.3.8 Norm for Natural Discharges

The Discharge Norm used in computing Unaccounted Natural Discharge is 5% if water table fluctuation method is used or 10% if rainfall infiltration factor method is used for assessing the Rainfall recharge. This committee recommends to compute the base flow for each assessment unit. Wherever, there is no assessment of base flow, earlier norms recommended by GEC 1997 i.e. 5% or 10% of the Total Annual Ground Water Recharge as the Natural Discharges may be continued.

## 2.4 UNIT DRAFT

GEC-1997 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 can be computed using the following equation:

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

One basic drawback in the methodology of computing unit draft is that there is no normalization procedure for the same. As per GEC-1997 guidelines, the recharge from rainfall is normalized for a normal rainfall. It means that even though the resources are estimated in a surplus rainfall year or in a deficit rainfall year, the assessment is normalised for a normal rainfall which is required for planning. For recharge from other sources, average figures/ values are taken. If the average figures are not available for any reason, 60% of the design figures are taken. This procedure is very much essential as the planning should be for average resources rather than for the recharge due to excess rainfall or deficit rainfall. 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 can be followed. If the unit draft values for one rainfall cycle are available for at least

10 years second method shown in equation 31 is to be followed or else the first method shown in equation 30 may be used.

$$\text{Normalised Unit Draft} = \frac{\text{Unit Draft} \times \text{Rainfall for the year}}{\text{Normal Rainfall}} \dots\dots\dots(30)$$

$$\text{Normalised Unit Draft} = \frac{-b \sum_{i=1}^n \text{Unit Draft}_i}{\text{Number of Years}} \dots\dots\dots(31)$$

Although GEC-1997 methodology recommends a default value for the unit drafts, each State is using its own values, generally after conducting field studies, even though without a documentation. Hence, it is felt that this norm may be computed by the state agency, which is going to assess the norms before commencement of the assessment. But it is strongly recommended that the field studies should be documented and submitted along with the results of the assessment.

**2.5 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 will provide common and standardized platform for Ground Water Resource Estimation for the entire country and its pan- India operationalization (Central and State Governments). The system will take ‘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

### 3.0 BACKGROUND

Madhya Pradesh is located in the central part of India or metaphorically, the heart of India. The State of Madhya Pradesh is a land-locked State, bordered on the west by Gujarat, on the northwest by Rajasthan, on the northeast by Uttar Pradesh, on the east by Chhattisgarh, and on the south by Maharashtra (**Fig 3.1**). It has a geographical area of 3,08,252 Sq. km. and is situated between north latitudes 21° 04' and 26° 54' and east longitudes 74° 00' and 82° 50'. There are 52 districts and 313 Community Development blocks in Madhya Pradesh. The population of state as per census 2011 is 7.27 crores with a population density of 236 persons per sq.km area. Out of total population, 72.37% is rural. The important urban areas in the State are Bhopal, Indore, Jabalpur, and Gwalior.

Madhya Pradesh comprises several linguistically and culturally distinct regions, of which the major regions are:

- Malwa - A plateau region in the northwest of the state, north of the Vindhya Range, with its distinct language and culture. Indore is the major city of the region, while Ujjain is a town of historical importance. Bhopal, the capital city, lies on the extension of Malwa Region and on the edge of Bundelkhand region.
- Nimar (Nemar): The western portion of the Narmada River valley, lying south of the Vindhyas in the southwest portion of the state. This region comprises Khandwa, Kargone, Burhanpur and Barwani districts.
- Bundelkhand: A region of rolling hills and fertile valleys in the northern part of the state, which slopes down toward the Indo-Gangetic plain to the north. Gwalior is an historic center of the region. This region encompasses Datia, Sagar, Damoh, Panna, Chhatarpur and Tikamgarh Districts.
- Chambal: The north-western region. A mountainous region rich in red, soft, and fragile sandstone. The climate is harsh, and the area is known for murderous pirates who were active in hundreds in the late 1900s. This region comprises Sheopur, Morena and Bhind districts.
- Baghelkhand: A hilly region in the northeast of the state, which includes the eastern end of the Vindhya Range. Satna, Rewa and Sidhi districts lie in this Region.
- Mahakoshal (Mahakaushal): The southeastern portion of the state, which includes the eastern end of the Narmada river valley and the eastern Satpuras. Jabalpur is the most important city in the region. Katni and Jabalpur districts lie in this Region.

- Central Vindhya and Satpura region: Occupy most of the central Narmada river valley. Hoshangabad, Harda, Narsinghpur districts lie in this Region.

Central Ground Water Board (CGWB), North Central Region, Bhopal in association with Ground Water Survey Department, Water Resources Department, Government of M.P. has assessed dynamic ground water resources of Madhya Pradesh for 317 assessment units (313 blocks and 4 urban areas i.e. Bhopal, Indore, Jabalpur, Gwalior) (**Fig-3.1**) according to the methodology recommended by the Ground Water Estimation Committee constituted by Government of India (GEC 2015). The Present report quantifies the dynamic ground water resources of Madhya Pradesh State for the base year 2023.

### **3.1 RAINFALL**

Madhya Pradesh experiences a tropical climate with wide variation in temperature. There are four seasons during the year. The summer season from March to Mid-June, the monsoon season from Mid-June to September, the post monsoon season in October-November, and the winter season from December to February, May is the hottest month, while January is the coldest.

Rainfall is the main source of recharge to ground water which contributes to nearly 76 % of the total annual ground water recharge, so rainfall pattern has an important impact on groundwater levels in the phreatic aquifer. A major part of the country receives rainfall mainly during SW Monsoon season spread over the months of June to September. Over 99 % of the annual rainfall is received in the four rainy months for June to September. August is the wettest month.

The district wise seasonal and annual rainfall observed during the year 2021 for the districts is given in **Table 3.1**. The district-wise observed monthly rainfall is given in **Table 3.2**. Annually as per 2021 rainfall data, the Guna District received the highest rainfall of 1827.3 mm where as Khargone District received the lowest rainfall of 679.6 mm.

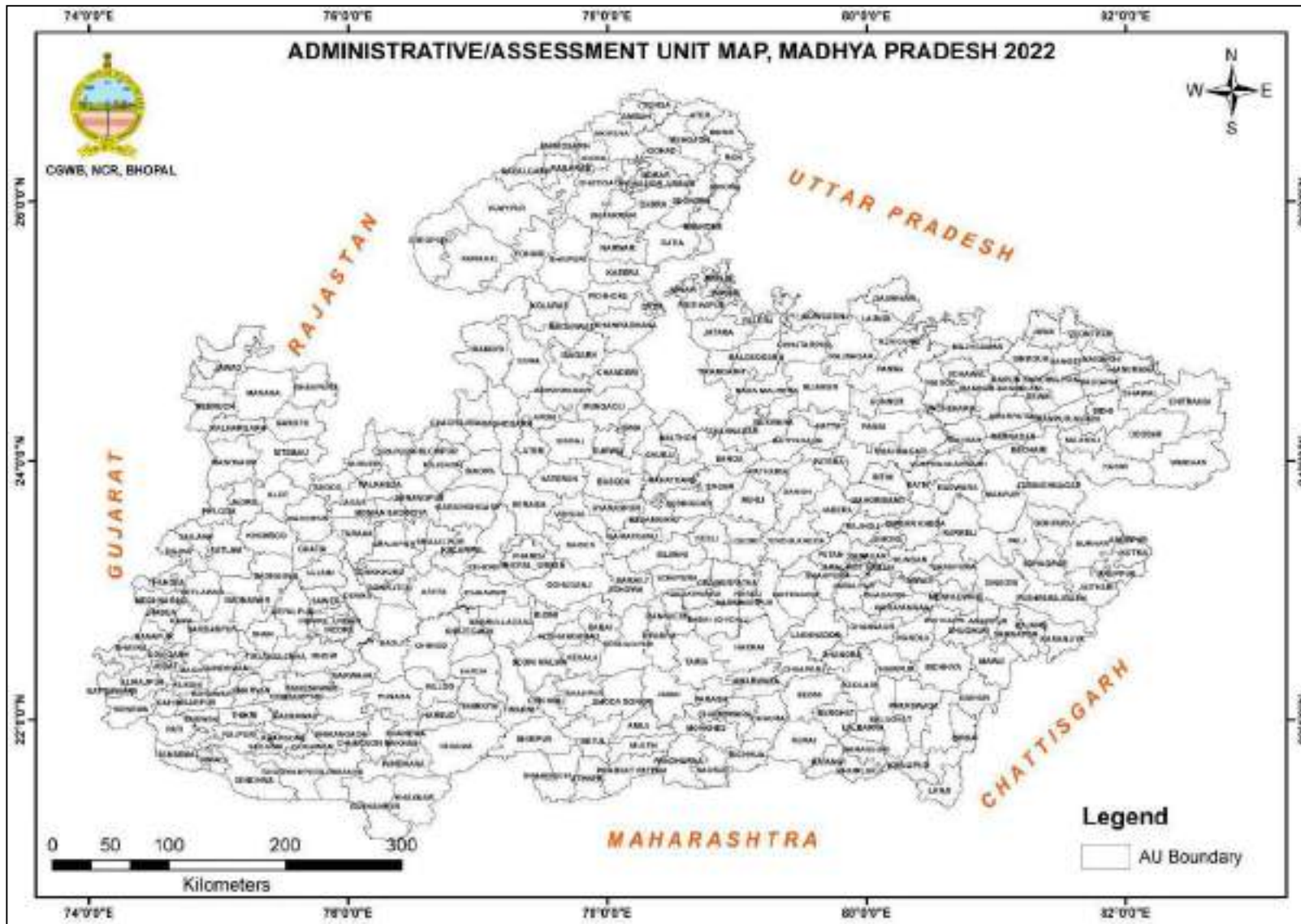


Fig 3.1: Administrative Map/ Assessment units of Madhya Pradesh

**Table 3.1: District-wise seasonal and annual Rainfall (mm) - Year 2021 (Source: IMD)**

S N	District	Winter	Pre-Monsoon	SW-Monsoon	Post-Monsoon	Annual
1	Agar-Malwa	3.1	50.1	1224.2	73.9	1351.3
2	Alirajpur	8.3	21.4	961.3	101.4	1092.4
3	Anuppur	42.3	91.9	1146.3	48.5	1329.1
4	Ashoknagar	2.3	75.5	1182.3	44	1304
5	Balaghat	26	51	985.5	58.9	1121.3
6	Barwani	8	16	644.1	87	755
7	Betul	13.9	62.1	1014.4	100.7	1191.1
8	Bhind	4.7	74.2	834.1	102.1	1015.1
9	Bhopal	4.4	87.8	979.8	75.1	1147.1
10	Burhanpur	1	12.6	777.4	144.2	935.1
11	Chhatarpur	6.4	67.7	719.4	48	841.5
12	Chhindwara	13.4	75.1	938.7	79.1	1106.3
13	Damoh	13.8	108.1	644.8	16.7	783.3
14	Datia	2.5	50.5	707.2	136.1	896.4
15	Dewas	4.4	12.8	961.4	82.2	1060.8
16	Dhar	10.3	4	650.5	110.9	775.7
17	Dindori	24.3	104.3	1088.4	59	1275.9
18	Guna	1.4	88.4	1632.5	105.1	1827.3
19	Gwalior	3.8	57	718.2	95.3	874.3
20	Harda	4	34.7	875.9	105	1019.6
21	Hoshangabad	3.3	35.1	1025.9	55.2	1119.4
22	Indore	9.4	35.3	836.6	154.8	1036.1
23	Jabalpur	12.2	74.1	718.9	40.9	846.3
24	Jhabua	18.2	11.4	829	54.2	912.7
25	Katni	2.9	93.1	708.2	24	828.2
26	Khandwa	4	11.8	837.5	96.3	949.5
27	Khargone	4.6	11.3	590.7	73	679.6
28	Mandla	24.3	87.5	1015.7	62	1189.5
29	Mandsaur	7.5	38.8	914.6	86.4	1047.3
30	Morena	4.5	74	658.2	40.3	777
31	Narsinghpur	2	30.4	882.4	28.2	943
32	Neemuch	23.3	89.9	1056.7	181.7	1351.6
33	Niwari	5	66.7	1027	124.7	1223.3
34	Panna	4.8	118.8	730.5	20.1	874.2
35	Raisen	3.5	67.9	1024.1	44.7	1140.1
36	Rajgarh	1.4	60.6	1194.3	83.8	1340
37	Ratlam	1.3	33.1	1035.4	76.9	1146.6
38	Rewa	0.6	120.3	1009.7	30.3	1160.8
39	Sagar	9.2	123.4	896.1	37.2	1065.9

S N	District	Winter	Pre-Monsoon	SW-Monsoon	Post-Monsoon	Annual
40	Satna	1.7	94.1	800.2	40.8	936.8
41	Sehore	1.8	36.2	944.8	101.7	1084.5
42	Seoni	26.4	119.1	784.1	61.2	990.7
43	Shahdol	12.6	111.2	971.7	44	1139.5
44	Shajapur	5.2	38.5	1066.5	79.1	1189.3
45	Sheopur	27.5	49.4	1344	200.8	1621.6
46	Shivpuri	2.3	84.1	1262.5	104.7	1453.5
47	Sidhi	1.4	139.7	992.2	12.8	1146
48	Singrauli	3.6	152.9	1255.9	28	1440.5
49	Tikamgarh	9	45.5	767.8	41.5	863.8
50	Ujjain	5.8	44	999.6	98	1147.3
51	Umaria	14.2	159.9	908.9	47.9	1130.9
52	Vidisha	5.6	81.7	1181.8	66.5	1335.6

**Table 3.2: District wise monthly Rainfall-Year-2021 (Source: IMD)**

S N	District	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	Anuppur	3.5	38.9	2.2	5.6	84.1	217.8	345.3	300.4	282.9	24.4	0	24.1
2	Balaghat	2.9	23.1	9.6	0.1	41.3	200.2	334.6	127.1	323.5	25.2	7.8	25.9
3	Chhatarpur	1.4	5	0.8	0	66.9	99.6	247.2	201.5	171.1	42.8	0	5.2
4	Chhindwara	2.7	10.6	8	2	65.1	273.3	245.7	153	266.8	46.7	16.5	15.8
5	Damoh	0.4	13.3	8.6	7	92.5	102	213.6	144.6	184.6	6.1	0	10.6
6	Dindori	0	24.3	7.3	3.9	93.1	227.2	388	214.2	259.1	30.1	6.6	22.3
7	Jabalpur	0	12.2	5.7	3.2	65.3	165.4	239.2	98.9	215.5	19.7	4.6	16.6
8	Katni	0	2.9	4.4	2.4	86.3	157.5	237.8	138.9	174.1	15.2	0	8.8
9	Mandla	2.1	22.2	8.6	0.7	78.2	273.8	297.9	194.7	249.3	30.1	9.3	22.6
10	Narsinghpur	0	2	8	0	22.4	319	245.6	141.4	176.4	18.2	0.4	9.6
11	Niwari	0	5	0	0	66.7	48.3	289	445.3	244.3	121.7	0	3
12	Panna	0.2	4.6	4.1	3.7	111	68.7	260.9	194.7	206.1	14.6	0	5.5
13	Rewa	0	0.6	0	1.3	119	250.3	214.1	327.9	217.5	16.7	0	13.6
14	Sagar	2	7.2	27.7	1.4	94.4	208.5	249.9	252.4	185.3	29.2	0	8
15	Satna	0	1.6	1.8	0.4	92	147.8	282.1	211.6	158.6	35.7	0	5.1
16	Seoni	5.8	20.6	6.8	1.4	110.9	220	233.4	109.2	221.5	45.7	0.3	15.2
17	Shahdol	0	12.6	2.8	4.7	103.7	238.2	261.4	296	176.1	26.7	0	17.3
18	Sidhi	0	1.4	2.4	0.3	137	290.1	247.4	301.6	153.1	5.9	0	6.9
19	Singrauli	1.3	2.3	0.5	1.3	151.1	323.6	338.7	378.7	214.8	22.9	0	5.1
20	Tikamgarh	5	4	5.8	2	37.8	101.3	195.5	274.8	196.3	40.5	0	1
21	Umaria	0.5	13.7	8.9	8.7	142.3	213.1	312.9	195.9	187	28.7	0	19.2
22	Agar-Malwa	3.1	0	0	0	50.1	85.4	401.9	348.3	388.6	72.1	0	1.8
23	Alirajpur	8.3	0	3.8	1.1	16.5	95.9	391.6	121.5	352.2	53.3	16.8	31.3
24	Ashoknagar	2.3	0	4.8	6.8	64	129.8	275.8	536	240.8	37.3	0	6.8
25	Barwani	8	0	0.1	0	15.8	72.3	151.4	150.4	270	47	14	26
26	Betul	1	12.9	15.7	5.4	41	228.7	378.8	168.7	238.1	78.7	15.4	6.7

S N	District	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
27	Bhind	2.3	2.3	13.1	1.9	59.2	39.9	434.7	179.1	180.4	98.6	1.1	2.5
28	Bhopal	4.4	0	29.6	2.2	56	289.9	204.7	259.6	225.5	71.7	0	3.4
29	Burhanpur	0.3	0.7	5.1	0.7	6.8	115.4	178.6	183.3	300.1	137.2	6.1	0.8
30	Datia	0.8	1.7	1.9	0	48.7	59.2	224.9	251.7	171.4	125.4	1.2	9.5
31	Dewas	3.2	1.2	5.4	0	7.4	195	244.3	227.8	294.3	80.2	0	2
32	Dhar	6.5	3.7	0	0	4	107	185.3	124.7	233.5	74.2	12.9	23.8
33	Guna	1.3	0.1	17.6	0	70.8	106.9	443	880.6	202	95.3	0.8	9
34	Gwalior	3.7	0.1	11	0.1	45.9	34.3	304.6	227.4	152	83.7	4.4	7.2
35	Harda	2.6	1.4	4.3	0	30.3	184.5	242.2	177.8	271.4	105	0	0
36	Hoshangabad	0.5	2.8	6.6	0	28.5	261.3	269.4	263.3	231.9	51.5	1.8	1.9
37	Indore	9.4	0	2.6	0	32.7	124.1	176.8	178	357.7	135.7	0	19.1
38	Jhabua	13.7	4.5	0	0	11.4	149.4	209.1	194	276.5	29.7	8.4	16.1
39	Khandwa	1.5	2.5	3.3	0	8.5	97	282.6	169.9	288	93.3	1.5	1.5
40	Khargone	1.5	3.1	2.9	0	8.5	92.7	149.3	114.8	233.9	58.4	1.2	13.4
41	Mandsaur	7.5	0	0	0	38.8	105.3	310.9	276.7	221.7	43.7	22.4	20.3
42	Morena	4.5	0	8	0	66	34.7	187.8	225.8	210	36.7	0.8	2.8
43	Neemuch	23.3	0	0	0	89.9	109	239.3	226	482.3	67	79.7	35
44	Raisen	1.3	2.1	24.7	0	43.2	255.1	231.3	320.5	217.3	34.3	0	10.4
45	Rajgarh	1.4	0	10.7	0	49.9	123.6	387.5	423.6	259.7	78.5	0	5.2
46	Ratlam	1.3	0	0	0	33.1	135.3	349.2	216.1	334.8	58.1	4.8	14
47	Sehore	0.5	1.3	12.2	0	24.1	231.6	255.6	206.7	251	101.2	0	0.5
48	Shajapur	5.2	0	9.8	0	28.7	150.8	361.4	262.5	291.8	78.2	0	0.9
49	Sheopur	27.5	0	4.1	0	45.3	40	420	717.9	166.1	168	19.2	13.5
50	Shivpuri	1.8	0.5	14.2	1.1	68.8	80.1	325.5	690.4	166.5	80.3	8.6	15.8
51	Ujjain	5.8	0	1	0	43	132.8	370.5	271.1	225.3	73.5	14.1	10.4
52	Vidisha	3	2.6	20.4	0.3	61	232.7	306	460.9	182.2	61.5	0.1	5

The normal annual rainfall for Madhya Pradesh is 1088 mm. The variation in normal annual rainfall is between 742.5 mm and 1471.6 mm. The rainfall decreases as we move from East to West and south to North. The highest normal annual rainfall occurs in Balaghat district (1471.6 mm) followed by Mandla, Annapur and Dindori districts, which are in southern and south eastern parts of State whereas lowest normal annual rainfall is recorded in 742.5 mm in Barwani district in the western part of Madhya Pradesh. The Normal annual rainfall map of Madhya Pradesh is shown in the **Fig 3.2**.

**Table.3.3: District wise Normal Annual Rainfall**

S.N	District	Normal Annual Rainfall (mm)	S.N	District	Normal Annual Rainfall (mm)
1	Agar Malwa	1036.1	27	Khargone	950.3
2	Alirajpur	912.8	28	Mandla	1427.7

S.N	District	Normal Annual Rainfall (mm)	S.N	District	Normal Annual Rainfall (mm)
3	Anuppur	1423.6	29	Mandsaur	753.7
4	Ashoknagar	926	30	Morena	753
5	Balaghat	1471.6	31	Narsinghpur	1191
6	Barwani	742.5	32	Neemuch	854.9
7	Betul	1145.55	33	Panna	1183
8	Bhind	951	34	Raisen	1207.3
9	Bhopal	1126.65	35	Rajgarh	972
10	Burhanpur	883.8	36	Ratlam	992.85
11	Chhatarpur	1092.7	37	Rewa	1141.5
12	Chhindwara	1139.25	38	Sagar	1205
13	Damoh	1176	39	Satna	1075.5
14	Datia	963.8	40	Sehore	1067.5
15	Dewas	1069	41	Seoni	1322
16	Dhar	856.5	42	Shahdol	1131.4
17	Dindori	1376.3	43	Shajapur	1036.1
18	Guna	1082	44	Sheopur	799.2
19	Gwalior	870	45	Shivpuri	994.9
20	Harda	1374	46	Sidhi	1154
21	Hoshangabad	1324.5	47	Singrauli	1120.2
22	Indore	976.8	48	Tikamgarh	943.6
23	Jabalpur	1279.45	49	Ujjain	861.5
24	Jhabua	865.4	50	Umaria	1242
25	Katni	1171.4	51	Vidisha	1135.3
26	Khandwa	951.65	52	Niwari	943.6

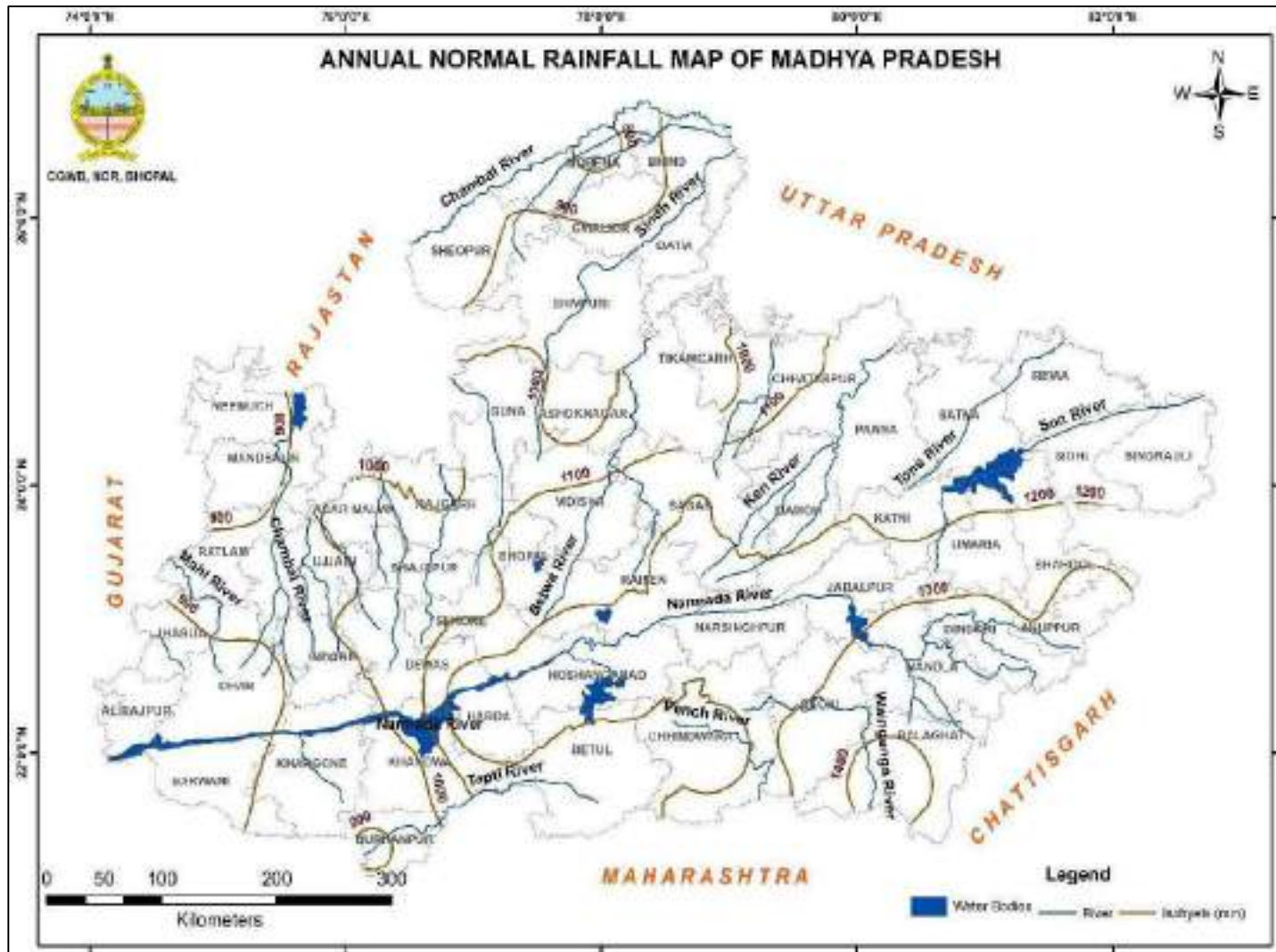


Fig 3.2: Annual Normal Rainfall Map, Madhya Pradesh

### 3.2 PHYSIOGRAPHY

The State exhibits six distinct physiographic units as follows:

- The Malwa Plateau
- The Satpura Range
- The Vindhyan Range
- The Mahakoshal Range
- The Bundelkhand Region
- The River valleys.

The Malwa Plateau marks the northern span of the Deccan Plateau and this region forms a part of the vast Deccan Plateau of Central India. The hill ranges run across the plateau. The Satpura Range located in the southern part of the State is E-W trending. It has an average elevation of 600 m amsl and highest elevation of 1350 m amsl. The Vindhyan range occupies in the northern and central part of the region and has ENE-WSW trend. The Mahakoshal Range also has a similar trend. The Vindhyan Range extends into the Malwa Plateau and Bundelkhand Region. The Vindhyan Range and Mahakoshal Range are separated from the Satpura Range by the Narmada River and vast tract of its basin area. The river valleys, other than the Narmada alluvial plain and Chambal alluvial plain, are very limited and form narrow belts along the rivers. Dhupgarh in Pachmarhi is on 1350 m amsl which is the highest elevation point in the state. The Physiography map of Madhya Pradesh is shown in the **Fig 3.3**.

### 3.3 GEOMORPHOLOGY

Major part of the state is occupied by pediment pediplain complex, dissected plateaus and dissected hills and valleys. Pediment Pediplain complex is the major landform covering about 180762 km<sup>2</sup> (nearly 59%), presently mostly in the western and northeastern side sparsely distributed in all other sides. The other major landform observed is moderate dissected plateau covering about 43709 km<sup>2</sup> (14.2%), highly dissected plateau in 11090 km<sup>2</sup> (3.5%), low dissected plateau in 8520 km<sup>2</sup> (2.8%), moderately dissected hills and valleys in 22012 km<sup>2</sup> (7.35%), low dissected hills and valleys in 6363 km<sup>2</sup> (2%). Dissected hills and valleys, flood plain and alluvial plain landforms are occupied very small part of the state. The geomorphology map of Madhya Pradesh is shown in the **Fig 3.4**.

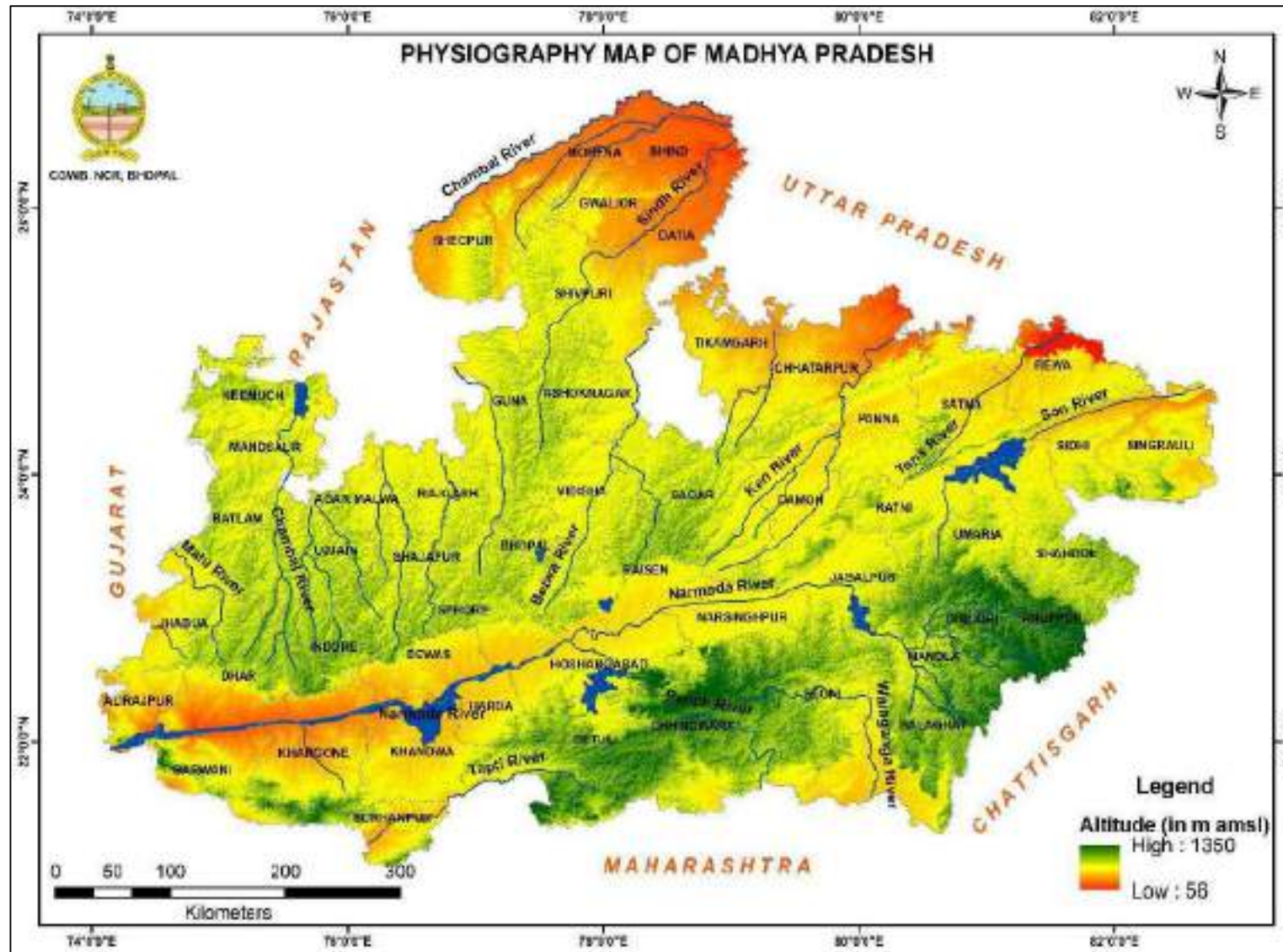


Fig 3.3: Physiography Map, Madhya Pradesh

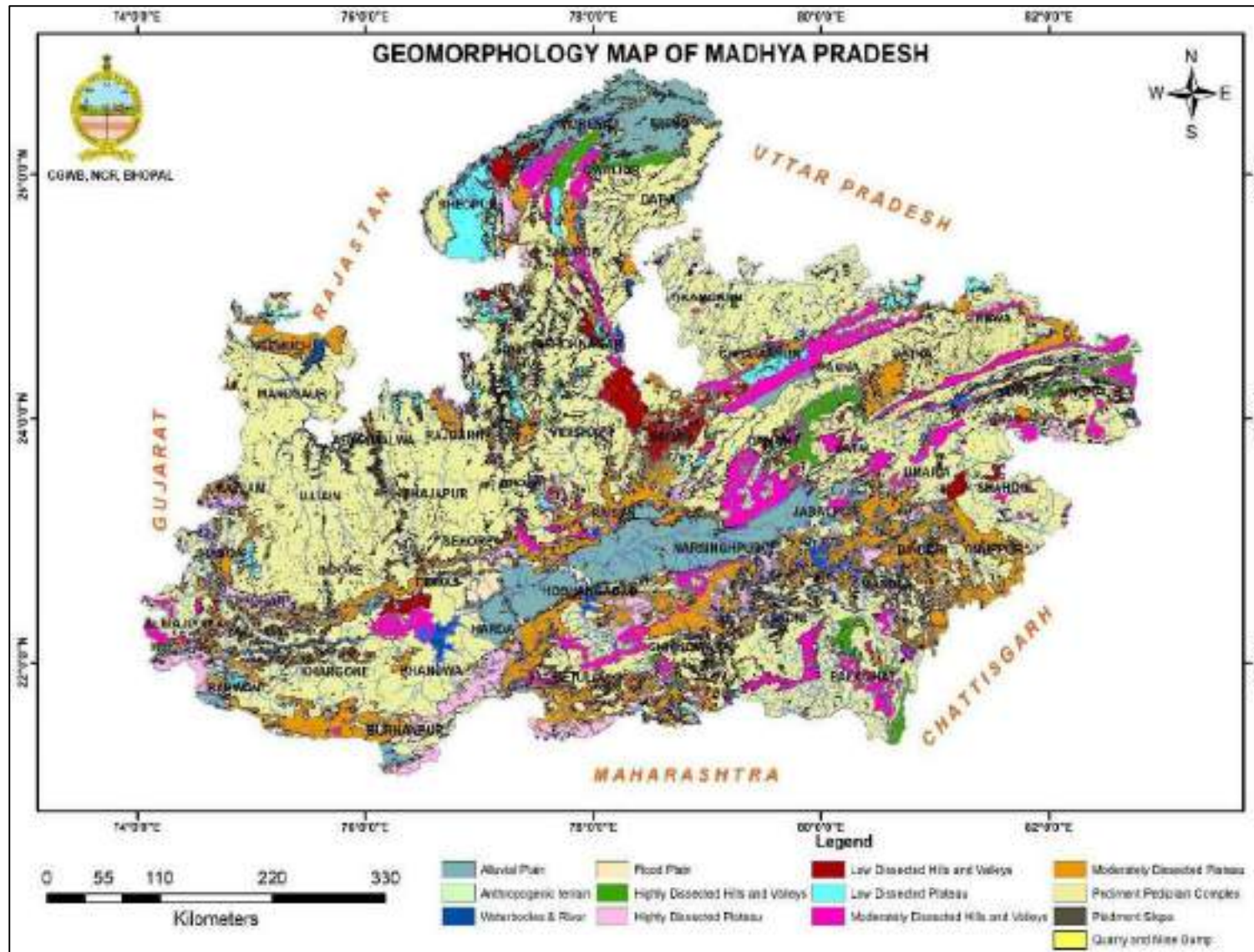


Fig 3.4: Geomorphology, Madhya Pradesh

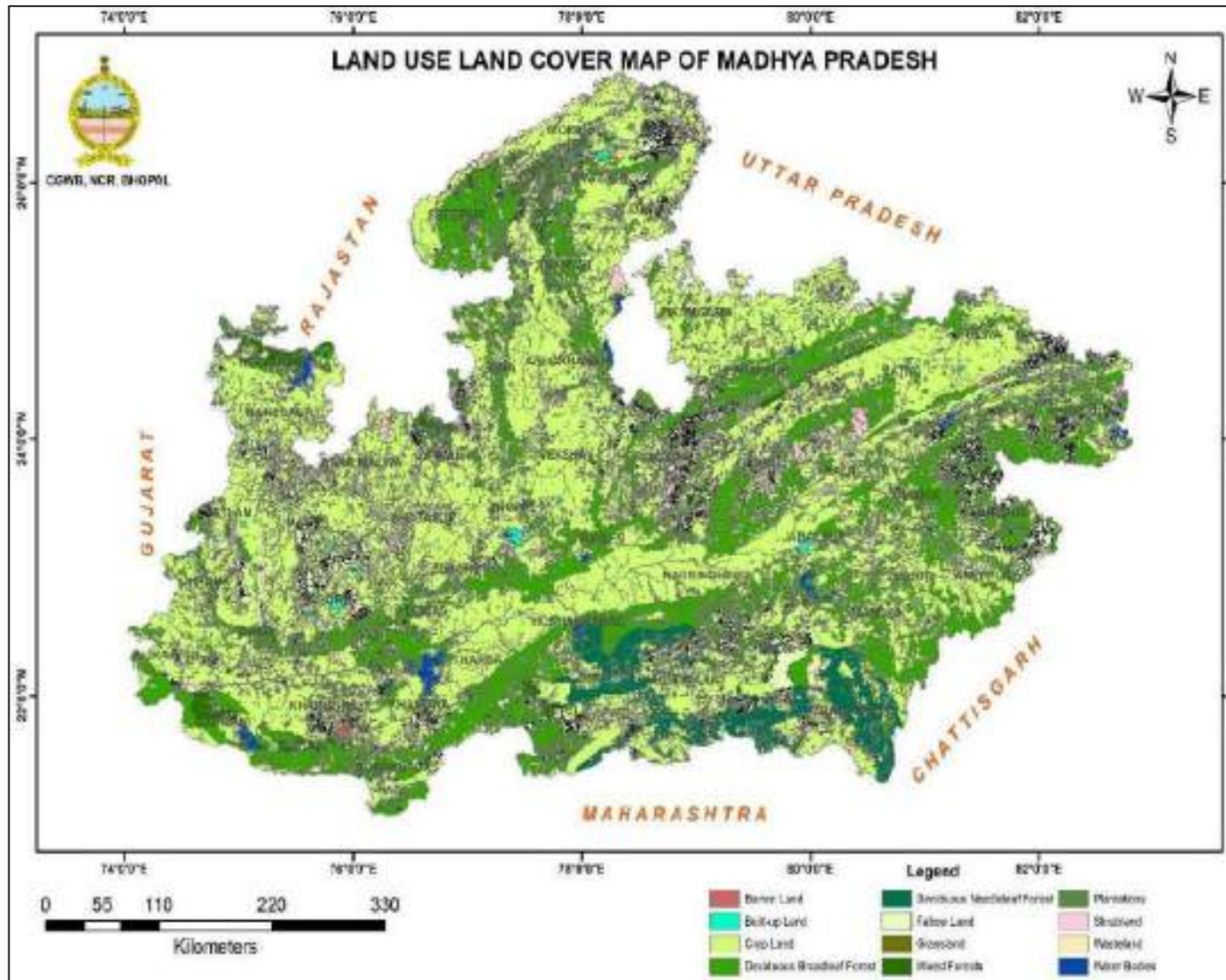


Fig 3.5: Land use Land Cover, Madhya Pradesh

### **3.4 LAND USE LAND COVER**

Agriculture and forest are the prominent land use aspects in the state and forms 55 % and 28 % of total area respectively followed by the shrub land and water bodies. The spatial distribution of land use is presented in **Fig 3.5**. (as per Land Use Land cover data, NASA, USA).

### **3.5 DRAINAGE AND BASINS**

Madhya Pradesh State represents great river basins and the watershed of a number of rivers. Catchments of many rivers of India lie in Madhya Pradesh. There are six river basins in Madhya Pradesh namely 1. Ganga Basin (1.1 Yamuna sub basin - Chambal sub-sub basin, Kunwari sindh sub-sub basin, Jamni sub-sub basin, Betwa sub-sub basin, Dhasan sub-sub basin, Ken sub-sub basin, Paisuni and Baidhan sub sub basin 1.2 Tons sub basin, 1.3 Sone sub basin), 2. Narmada Basin, 3. Godavari Basin, 4. Tapti Basin, 5. Mahi Basin and 6. Mahanadi Basin. The basins of Madhya Pradesh are shown in the **Fig 3.6**. As Madhya Pradesh is located in the center of India, most of the rivers are interstate rivers. The rivers namely, Chambal, Sindh, Betwa, Ken flows northward and meet with Yamuna, whereas the Sone River falls directly into Ganga. Narmada, Tapti and Mahi Rivers flow westward and meet Arabian Sea whereas Wainganga and PENCH Rivers meet Godavari in the south. The Narmada (originating from Amarkantak) and Tapti (originating from Multai in Betul District) Rivers and their basins divide the state in two, with the northern part draining largely into the Ganga basin and the southern part into the Godavari and Mahanadi systems. The Vindhya form the southern boundary of the Ganga basin, with the western part of the Ganga basin draining into the Yamuna and the eastern part directly into the Ganga itself. All the rivers, which drain into the Ganga, flow from south to north, with the Chambal, Kshipra, Kalisindh, Parbati, Kuno, Sind, Betwa, Dhasan and Ken Rivers being the main tributaries of the Yamuna. The land drained by these rivers is agriculturally rich, with the natural vegetation largely consisting of grass and dry deciduous forest types. The eastern part of the Ganga basin consists of the Son, the Tons and the Rihand Rivers, with the Son being the major tributary. This is also the junction point of the Satpura and the Vindhya Ranges, with the Maikal and Kaimur Hills being the fulcrum. The forests here are much richer than the thorn forests of the northwestern part of Madhya Pradesh. The Son River is of great significance in that it is the largest tributary going into the Ganga on the south bank and arising out of the hills of Madhya Pradesh rather than from the Himalayas. This river and its tributaries contribute the bulk of the monsoon flow into Ganga, because the north bank tributaries are all snow fed. The major tributary of the Ganga, the Son River, arises in one of the most important watersheds in India, the Maikal hills around Amarkantak. Three of the great

rivers of India, Narmada, Mahanadi and Son, are given birth to by these hills. This is also one of the few ranges in the state having a north south configuration. The Mahanadi itself, together with its tributaries such as Hasdeo, Mand and Kharun flows southeast into Chhattisgarh and converts that state into a green rice bowl. The upper Mahanadi catchment contains some of the finest forests in the state, ranging from mixed deciduous to teak, bamboo and sal. Just as the Mahanadi flows east from the Maikal hills and the Son flows north, the mighty Narmada charts a westerly course from these very hills. The Narmada flows through a rift valley, with the Vindhyas marching along its northern bank and the Satpuras along the southern. Its tributaries include Banjar, Tawa, Machna, Denwa and Sonbhardra Rivers. Taken in combination with its parallel sister river, the Tapti, which also flows through a rift valley, the Narmada - Tapti systems carry an enormous volume of water and provide drainage for almost a quarter of the land area of Madhya Pradesh.

The Satpuras, in the Gawligarh and Mahadeo hills, also contain a watershed, which is south facing. The Indrawati, Wainganga, Wardha, Pench, Kanhan and Penganga Rivers, discharge an enormous volume of water into the Godavari system. The Godavari is the lifeline of Andhra Pradesh, but the water which feeds it is a gift of the central India watershed.

### **3.6 HYDROGEOLOGICAL UNITS AND AQUIFER PARAMETERS**

The State of Madhya Pradesh has varied hydrogeological characteristics due to which ground water potential differs from place to place. The area is underlain by various geological formations ranging in age from the Archaean to the Recent. Hard rock areas cover more than 80% of total land area of the State. These hard-rock areas show wide variations and complexities in nature and composition of rocks, geological structures, geomorphological set up and hydro meteorological conditions. The crystalline rocks of Archaean age like granite, gneiss, granulites, schist, quartzite and granitoids occupy about 14.7% of geographical area of the State.

The basaltic rocks of Deccan lava flows are the predominant formations and occupy nearly 44.5% of total geographical area. The consolidated sedimentary rocks of Vindhyan Super Group and Mahakoshal (Cuddapah) Super Group of Proterozoic age occupy about 19.1% of total geographical area and the semi consolidated (Gondwana Formation) occupies about 6.7%. Recent unconsolidated alluvial sediments occupy about 14.4% of total geographical area. The Hydrogeological units of the state and their potential is described in **Table 3.4** and shown in **Fig 3.7**.

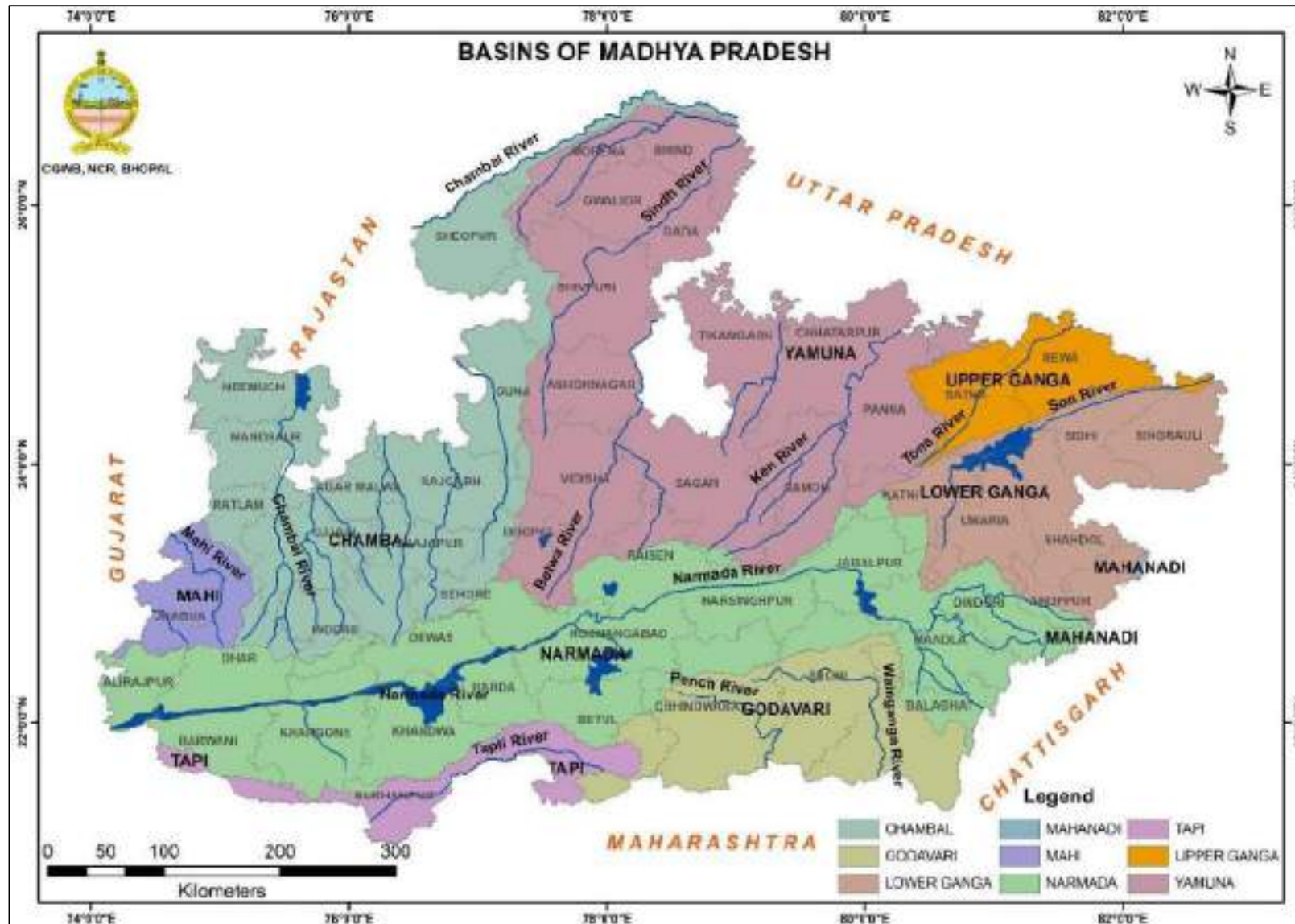
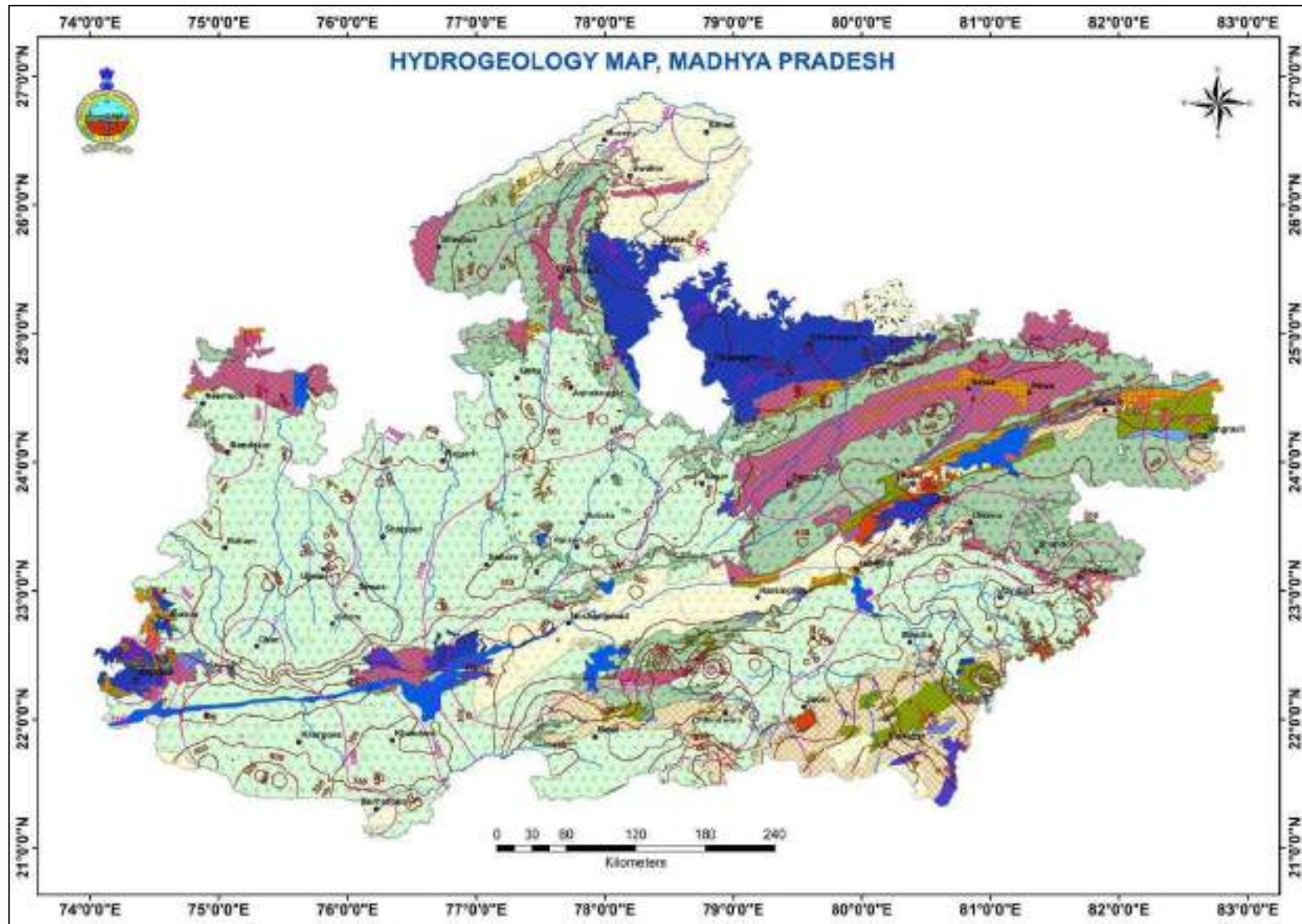


Fig 3.6: Basins and Major Rivers, Madhya Pradesh



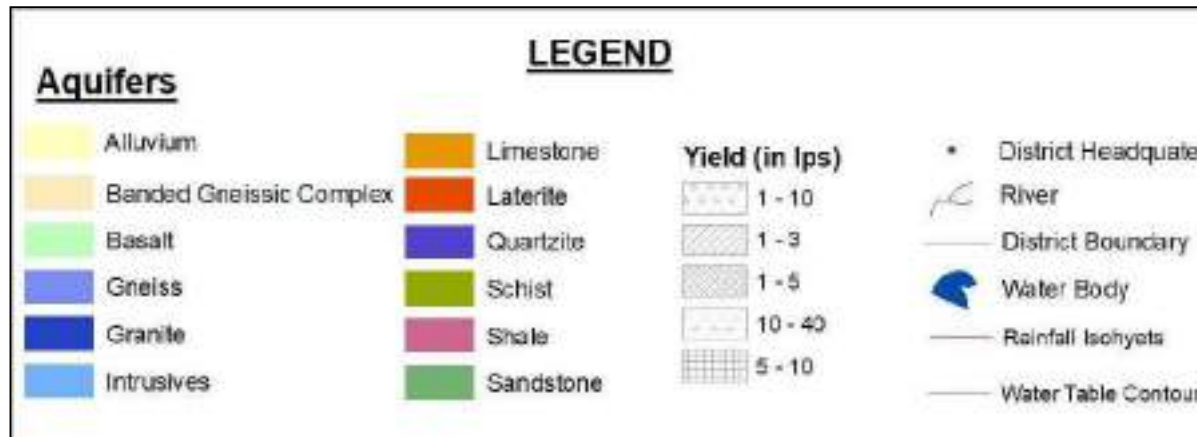


Fig 3.7: Hydrogeology Map, Madhya Pradesh

Table- 3.4: Hydro geological Units, their Potential and Groundwater Scenario, Madhya Pradesh

Geological Age	Group	Rock Formation	Surface Exposure Area (Approx.)	Occurrence and Hydrogeological Characters.
<b>Pleistocene to Recent</b>	Alluvial plains (older and Newer Alluvium)	Unconsolidated clays and silts, gravels and sands of different mix. Lenses of Peat and organic matter carbonate and siliceous concretions (Kankars)	38,000 Sq.Km.	Occur widespread in Bhind (Chambal basin), Hoshangabad and Narsimhapur districts (Narmada basin) and also in Sheopur, Morena, Datia, Chhatarpur, Jabalpur, Katni, Khandwa, Burhanpur, Raisen, Sidhi and Balaghat districts and along rivers in some other districts. Form very potential aquifers with a thick sequence of sandy aquifers down to great depths (>300 m.bgl). The aquifers are unconfined, semi-confined (leaky confined) or confined. The transmissivity up to 6700 m <sup>2</sup> /day. Discharge is up to 30 lps. Specific yield is up to 12%.
<b>Cretaceous to Eocene</b>	Deccan Trap	Basalts	1,43,300 Sq.Km.	Occupy the Malwa plateau covering Neemuch, Mandsaur, Indore, Dhar, Ratlam, Shajapur, Sagar, Rajgarh, Sehore, Badwani, Khargone, Khandwa and Burhanpur districts and parts of Jhabua, Raisen, Guna, Ashoknagar, Vidisha, Bhopal, Sehore, Betul, Jabalpur, Katni, Hoshangabad, Harda, Narsimhapur, Chhindwara, Seoni, Dindori, Mandla, Shahdol and Anuppur districts. Weathered, Fractured and vesicular basaltic layers of Traps, inter-trappeans and infratrappeans form productive

Geological Age	Group	Rock Formation	Surface Exposure Area (Approx.)	Occurrence and Hydrogeological Characters.
	Bagh and Lameta Groups	Sandstone, cherty limestone	8,500 Sq.Km.	unconfined hallow aquifers and leaky confined/confined deeper aquifers. Discharge is upto 5 lps. (Infra trappeans are less productive). Transmissivity is up to 250 m <sup>2</sup> /day.Sp.Yield up to 3%. Infra Trappean formation of Bagh & Lametas occurs in Dhar, Jhabua & Jabalpur districts and small patches in Sagar, Hoshangabad and Narsimhapur districts.
<b>Palaeozoic to Cretaceous</b>	Gondwana super Group. Jabalpur, Mahadeva, Panchet, Raniganj, Barakars and Talchir Groups	Boulder beds, Sandstones, shales, clays, limestone, coal seams	28,000 Sq.Km.	Occur in Betul, Chhindwara, Narsimhapur, Hoshangabad, Jabalpur, Katni, Sidhi, Umaria, Shahdol and Anuppur districts. Possess moderate primary porosity. Groundwater occurs under phreatic as well as semi-confined to confined conditions. Free flowing conditions with free flow discharge of 150 to 200 lpm have been recorded in North-eastern part of Jabalpur district. The transmissivity is up to 300 m <sup>2</sup> /day. Discharge is up to 8 lps. Specific yield is found up to 3 %.
<b>Proteozoic</b>	Vindhyan Super Group. Bhandar, Rewa, Kaimur and Semri Groups. Mahakoshal (Cuddaph) Super Group Bijawar and Gwalior Groups.	Shales, Sandstones and limestones	58,700 Sq.Km.	Occur in Gwalior, Morena, Sheopur, Shivpuri, Guna, Ashoknagar, Rewa, Panna, Satna, Jabalpur, Katni, Damoh, Sagar, Chhatarpur, Raisen, Bhopal, Vidisha, Neemuch, Mandsaur and Dewas districts. Generally, devoid of any primary porosity. Weathering and denudation, structurally weak planes and fractures impart porosity and permeability in the rock mass. Solution cavities (Cavernous) in carbonate rocks, at places give rise to large groundwater storage/circulation. The transmissivity is up to 250 m <sup>2</sup> /day. Discharge is up to 4 lps. Specific yield is found up to 3 %. In karstified limestone the specific yield is up to 10 %.

Geological Age	Group	Rock Formation	Surface Exposure Area (Approx.)	Occurrence and Hydrogeological Characters.
Archaeans	Older Metamorphics Sausar, Sakoli and Chilpi Groups. & Bundelkhand Granites.	Granitoid gneisses, schists, gneisses, quartzites and granites	31,500 Sq.Km.	Occur in Seoni, Balaghat, Shahdol, Anuppur, Mandla, Dindori, Sidhi, Rewa, Panna, Datia, Tikamgarh, Gwalior, Chhatarpur, Jabalpur, Katni, Jhabua and Shivpuri districts, as also parts of Chhindwara, Harda, Hoshangabad, Narsimhapur and Dewas districts. Do not possess primary porosity. Weathering, fracturing, jointing impart secondary porosity. Groundwater mostly occurs under unconfined to semi confined conditions. Transmissivity is upto 100 m <sup>2</sup> /day., Discharge is up to 2 lps and Specific yield is up to 2%.

### **3.6.1 Archaeans**

Archaeans comprise old metamorphic, granites, gneisses and schist. They are hard and compact formations with low primary permeability, forming poor aquifers. Ground water occurs in these only in the weathered mantle and underlying fractured zone. Groundwater mostly occurs under unconfined to semi confined conditions. Transmissivity is found upto 100 m<sup>2</sup>/day., Discharge is up to 2 lps and Specific yield is up to 2%.

### **3.6.2 Vindhyaans**

These are composed of sandstone, shale and limestone. The sandstone and shale are hard and compact and form poor aquifers. Ground water occurs in these in the weathered mantle and fractured zone. The limestone is different in its hydrogeological properties having large solution cavities, which give rise to immense secondary permeability. The transmissivity is found up to 250 m<sup>2</sup>/day. Discharge is up to 4 lps. Specific yield is found up to 3 %. In karstified limestone the specific yield is up to 10 %.

### **3.6.3 Gondwana**

The Gondwanas are sedimentary formations rich in granular zones and form good aquifers. They support both dugwells and tubewells, capable of yielding 8 lps. The transmissivity is found up to 300 m<sup>2</sup>/day and Specific yield is found up to 3 %.

### **3.6.4 Infra Trappeans**

The Bagh and Lameta beds and Nimar sandstone are also sedimentary formations but have a limited extent and poor to moderate permeability. The limestone and calcareous clays when karstified form productive aquifers. The corraling limestone, the marls and nodular limestone are hard and compact having poor permeability. The Nimar sandstone has intergranular porosity, joints, fracture, bedding planes, which give moderate scope for ground water movement. The depth of wells varies from 3 to 13 m and depth to water level between 2 to 12 m bgl.

### **3.6.5 Deccan Traps**

These form the most important aquifers in the region. The weathered, fractured, jointed and vesicular units of basalts form moderate to good aquifers. Discharge is upto 5 lps. Transmissivity is up to 250 m<sup>2</sup>/day and Secific Yield is up to 3%. The Deccan Traps formations can be tapped by dug well, dug-cum-bore and bore wells. It is observed that the yield increases by 5-10 times when 10-15 m bores wells extending down to the lower vesicular and bore well are drilled at the base of dug wells. Yields of 400-600 m<sup>3</sup>/d can be obtained in this way. In some areas the control of doleritic dykes on occurrence of ground water is observed. Wells

located on the upstream side of these dykes produce yields. Also wells located on tectonic lineaments gave better yields.

### **3.6.6 Alluvium**

It consists of unconsolidated gravel, sand, silt, clay in various proportions and has primary inter-granular porosity and permeability. Hence it is the most promising formation for ground water development. The thickness of alluvium varies from 10 to 318 m with aquifer thickness from 10 to 160 m being more in the Ganga basin than in the Narmada basin. The depth to water ranges from 5 to 30 m bgl. The transmissivity is high in the Ganga basin being upto 3000 m<sup>2</sup>/d. In the Narmada basin transmissivity ranges between 83-283 m<sup>2</sup>/d. the yields vary from 30 to 50 m<sup>3</sup>/hr for shallow wells and 30-200 m<sup>3</sup>/hr for deep wells in the Ganga basin. In the Narmada basin the yields are of the order of 15-30 m<sup>3</sup>/hr in the phreatic zone and 70-200 m<sup>3</sup>/hr in the deeper zone. In the Waingangā sub basin, the wells yield 60-600 m<sup>3</sup>/d. In the Tapi basin, the yields are 25-95 m<sup>3</sup>/d.

## **3.7 GROUND WATER LEVELS SCENARIO**

### **3.7.1 Depth to Water Level**

Groundwater level refers to underground surface below which the ground is wholly saturated with water. The upper surface of the zone of saturation is the water table. In case of wells penetrating confined aquifers, the water level represents the pressure or piezometric head at the point. The configuration of the water table depends upon topography, geology, climate water yielding and water bearing of rocks in the zones of aeration and saturation which control ground water recharge.

During the water year 2022-23, the existing monitoring wells (**Fig 3.8**) were monitored four times, i.e., during May 2022, August 2022, November 2022 and January 2023. With the field data, maps were prepared for visual interpretation of the behaviors of the ground water levels. Depth to ground water levels were demarcated into various zones in the ranges of less than 2 m, 2-5 m, 5-10 m, 10-20 m and more than 20 m. The description of the depth to water levels during pre-monsoon (May) and post monsoon (November) monitoring seasons is as follows:

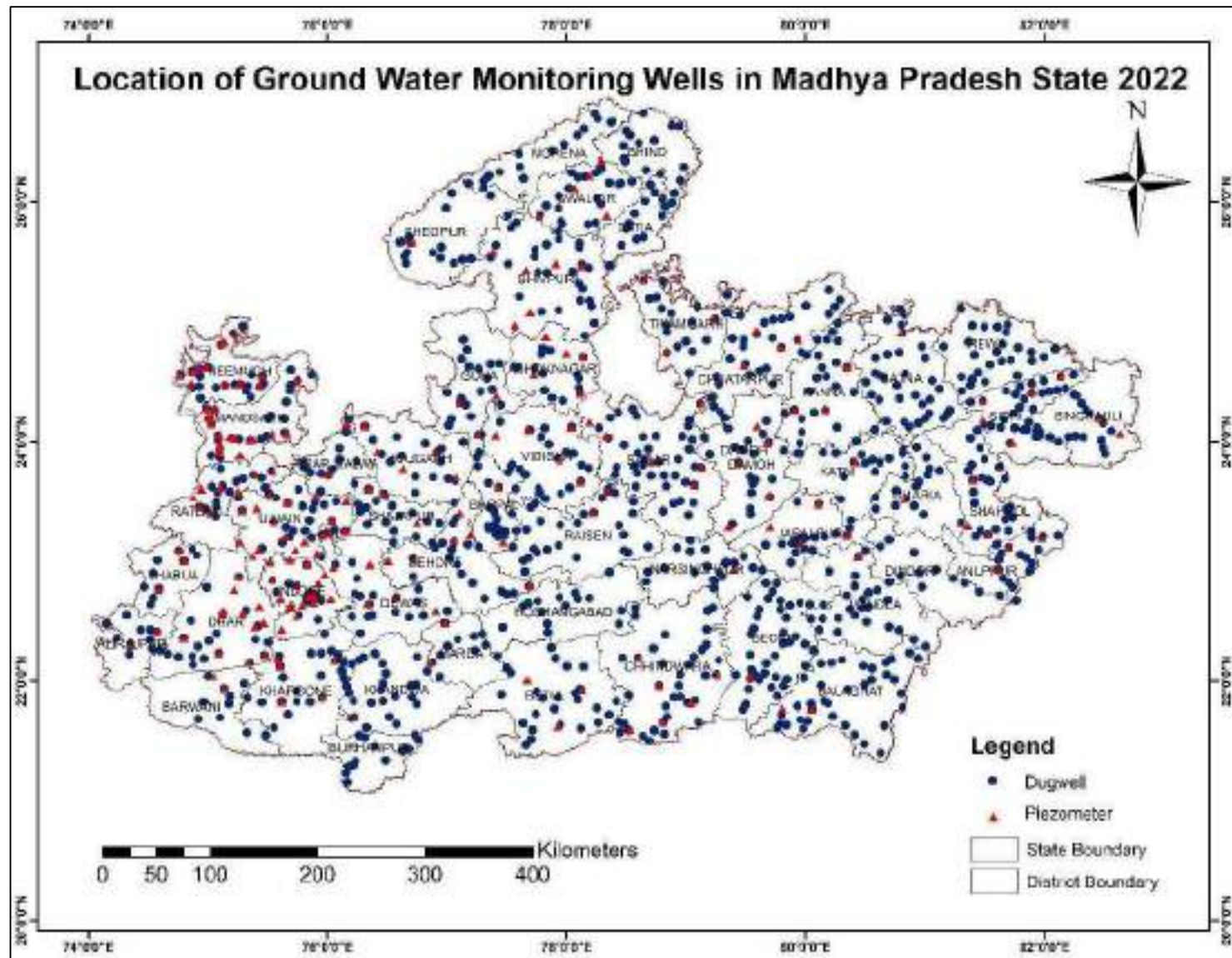


Fig 3.8: Location of Groundwater Monitoring Wells, Madhya Pradesh

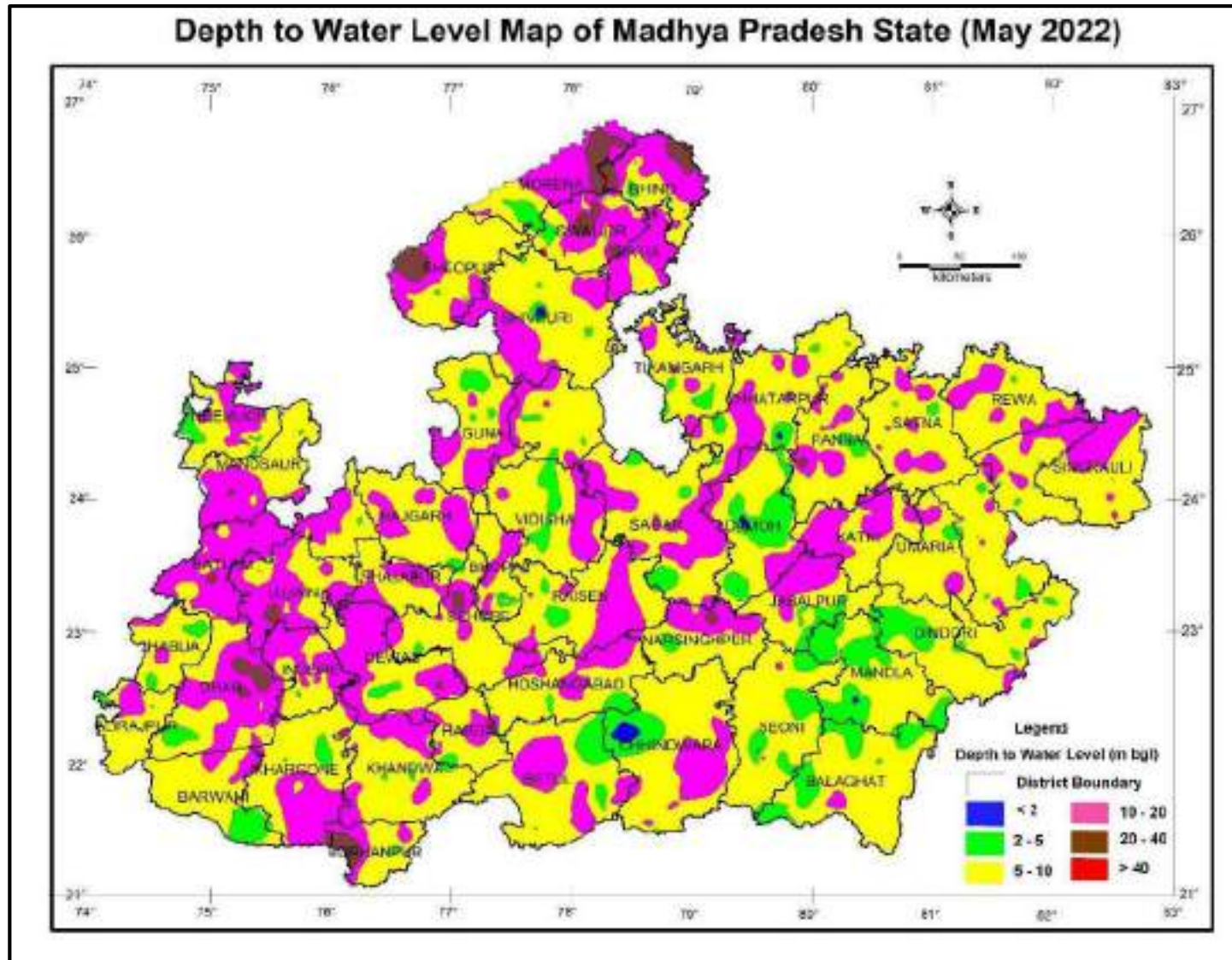


Fig 3.9: Pre monsoon Water level (May-2022), Madhya Pradesh

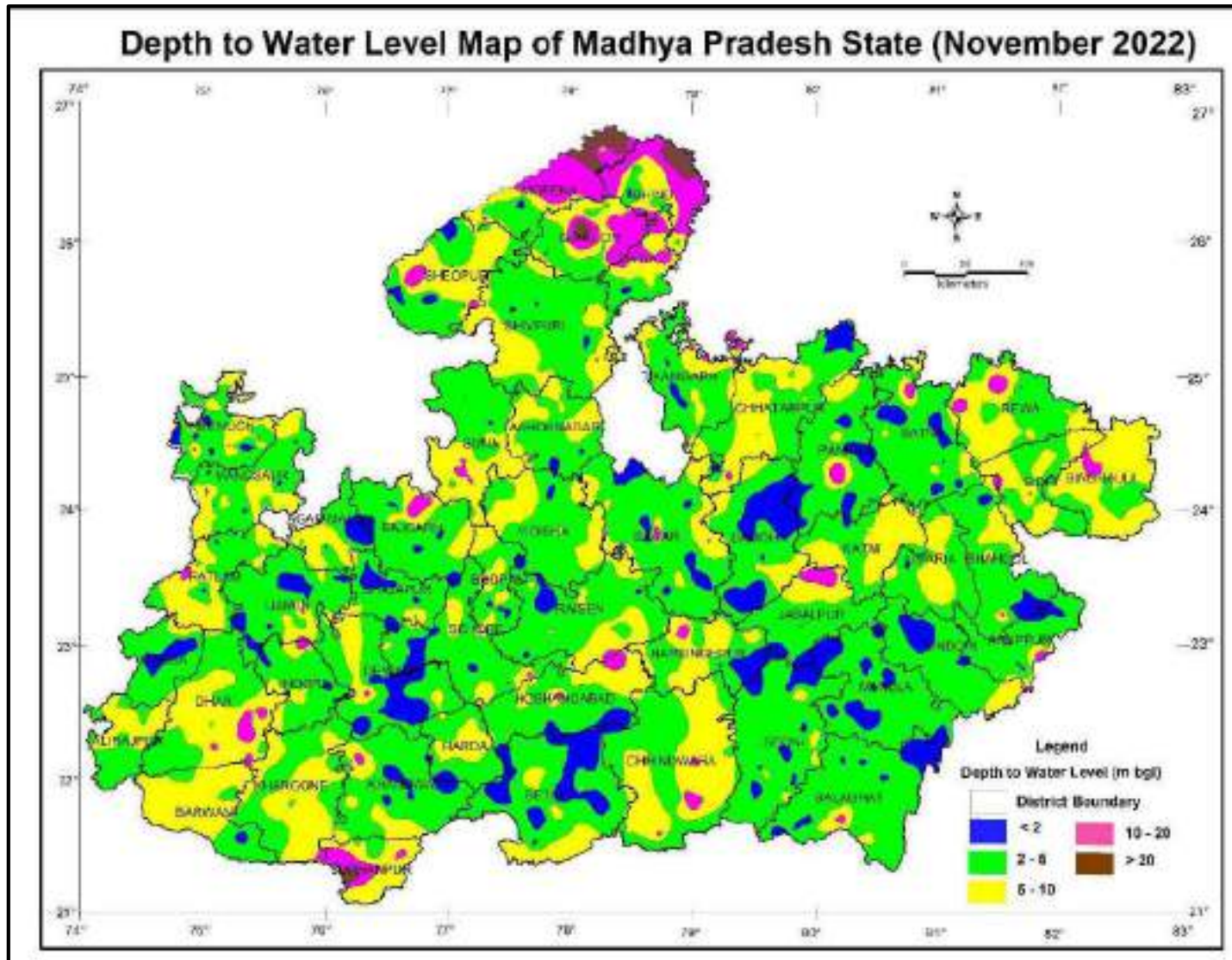


Fig 3.10: Post monsoon Water level (Nov-2022), Madhya Pradesh

### **3.7.1.1 Depth to Water Level: Pre-Monsoon (May- 2022)**

Depth to Water levels ranges from 0.2 m bgl at Bhagora village, Shivpuri block, Shivpuri district to 44.62 m bgl at Nayagaon village, Ghatigaon block, Gwalior district. Very shallow water levels up to 2 m bgl are observed in very few wells (1.43% wells) and observed as small patches in parts of Shivpuri, Damoh, Mandla, Chindwara and Chhatarpur districts. About 15.44 % of the monitoring stations in the state have water levels ranging from 2-5 m bgl and occur in patches mostly in Central, Central-eastern and south eastern parts of state. Depth to water levels ranging from 5-10 m bgl is observed in 50.68% of the wells and they are spread in most parts of the State. Deeper groundwater levels ranging from 10-20 m bgl is observed in 29.75 % of the wells seen mostly in northern western, central, parts of the north-eastern parts, and in southwestern parts of the state in isolated patches. Groundwater levels of 20-40 m bgl are found in about 2.55 % of the wells found in Sheopur, Datia, Gwalior, Morena, Narsinghpur and Bhind confining to the northern part of the state and it is found in patches. Depth to Water level of more than 40 m bgl is found in 00.16 % of the wells and is found in the northern parts of the districts. The depth to water level map of Madhya Pradesh State for May 2022 is shown in **Fig 3.9**.

### **3.7.1.2 Depth to Water Level: Post-Monsoon (November-2022)**

Depth to Water levels ranges from at ground level to 37.67 m bgl in Nayagaon village, Ghatigaon block, Gwalior district. Very shallow water levels up to 2 m bgl are seen in Betul, Sehore, Dewas, Jhabua, Agar Malwa, Shajapur, Ujjain, Damoh, Sagar, Raisen, Shahdol, Narsinghpur, Sheopur, Khandwa and Sagar, in pockets in many districts and about 19.12% of monitoring wells recorded water level less than 2 m bgl. About 47.79 % of monitoring wells spreading all over Madhya Pradesh state has recorded a water level in the depth range of 2-5 m bgl. Depth to water levels ranging 5-10 m bgl is noticed prominently in patches in all parts of the state and about 25.90 % of wells fall in this category. Deeper ground water levels ranging 10-20 m bgl are seen in northern part and in isolated patches in Dhar, Indore, Rajgarh, Burhanpur, Ratlam, Hosangabad, Chinndwara, Jabalpur, Rewa, Singrauli, Panna, Anuppur, and Balaghat districts and about 6.37 % of wells in the state fall in this category. Ground water levels of more than 20 m are found in about 0.78% of the wells and are seen in Bhind, Morena and Gwalior Districts. The depth to water level map of Madhya Pradesh State for November 2021 is shown in **Fig 3.10**.

## **3.8 HYDROCHEMISTRY OF GROUNDWATER**

Water samples were collected from 1143 Ground Water Monitoring Wells during May 2022 and monitored for chemical quality of ground water (phreatic aquifer) and their location is

given in **Fig 3.8**. Detailed analysis of the chemical samples was carried out parameters namely: pH, Electrical Conductivity (EC), Carbonate, Bi-carbonate, Chloride, Fluoride, Nitrate, Sulphate, Phosphate, Total hardness, Calcium, Magnesium, Sodium and Potassium.

### 3.8.1 Salinity

The salinity of water is represented by electrical conductivity. Electrical conductivity is a numerical expression of the ability of water to conduct an electric current. It depends on the total concentration of the ionized substances dissolved in water and the temperature at which the measurement is made. Electrical conductivity increases by about 2% per degree Celsius rise in temperature. The mobility of the dissolved ions, their valencies and their concentration affect conductivity. As electrical conductivity is an index of salinity in water, high electrical conductivity means high salinity. High salinity not only imparts bad taste to drinking water but such water is not suitable for irrigation purposes as it leads to deposition of salt content in the soil and affects the fertility of soil in the absence of adequate soil management practices.

The water having electrical conductivity upto 1000  $\mu\text{Siem}$  at 25°C may be considered fresh and suitable for drinking purpose. The Ground water quality of Madhya Pradesh is generally good as 61.07 % wells have electrical conductivity below 1000  $\mu\text{Siem}$  at 25°C. The chemical quality of ground water of Madhya Pradesh is generally good as the perusal of the frequency distribution of electrical conductivity in Groundwater. **Table. 3.5** shows that 38% wells fall in the range of 1000-2000  $\mu\text{Siem}$  at 25°C and only 1% wells have electrical conductivity more than 3000  $\mu\text{Siem}$  at 25°C. The salinity tolerant crop may be grown in the area where electrical conductivity is more than 2000  $\mu\text{Siem}$  25°C.

**Table 3.5: Frequency distribution of electrical conductivity in phreatic aquifer range**

EC Range ( $\mu\text{S/cm}$ at 25°C)	No. of Samples	%
0-1000	698	61.07
1000-3000	433	37.88
>3000	12	1.05

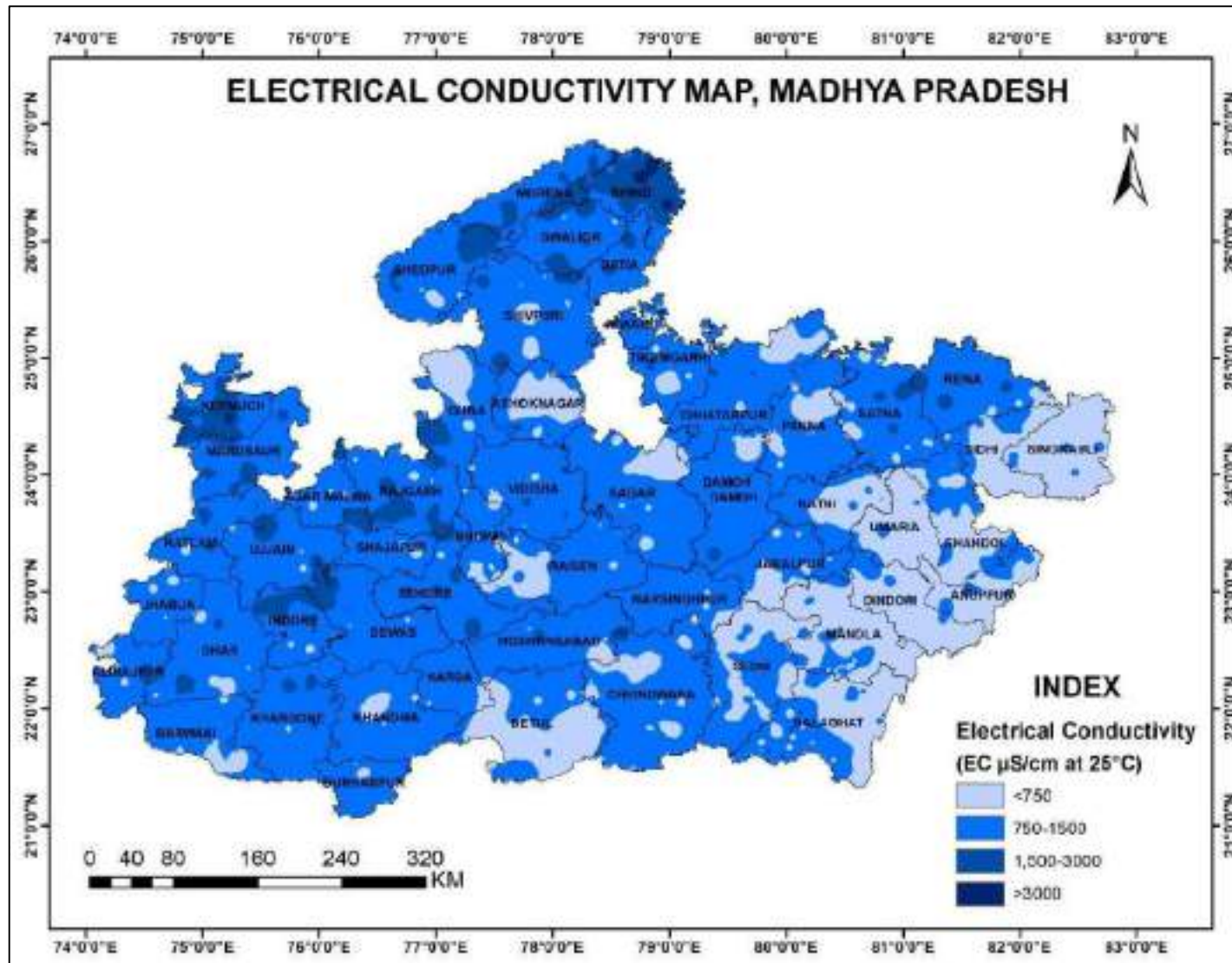


Fig 3.11: Electrical Conductivity in shallow aquifer, Madhya Pradesh

### 3.8.2 Fluoride

Generally, fluoride is present in low concentration in natural water. The presence of fluoride in ground water is very important from health point of view for human consumption as in low concentration; it prevents dental caries (upto 1.0 mg/l). However, the high concentration of fluoride above the permissible limit of 1.5 mg/l in drinking water (IS: 10500 Drinking water standards) is harmful for human consumption as it causes mottling of teeth and skeletal fluorosis. Its accumulation leads not only to high skeletal concentration, but also has crippling ill effects.

In Madhya Pradesh fluoride rich water in Groundwater occurs in Anuppur, Chhatarpur, Datia, Dindori, Neemuch, Seoni, Shajapur, and Singrauli districts. The distribution of fluoride in the State is shown in **Fig 3.12**. Flouride analysis reveals that there is no specific trend observed for distribution of Fluoride in the State. The maximum fluoride concentration has been observed at Kurri of Chhatarrpur district (1.95 mg/l).

**Table 3.6: Frequency Distribution of Fluoride in Phreatic Aquifer**

Fluoride Conc. Range (mg/l)	No. of Samples	%
< 1.00	1019	89.2
1.00-1.50	109	9.5
> 1.50	15	1.3

The frequency distribution of Fluoride is given in the **Table.3.6** shows that in 98.7% (1128 nos.) wells Fluoride concentration is within the desirable limit of 1.5 mg/l where as 1.5% (15 nos.) wells show Fluoride concentration above the maximum permissible limit of 1.5 mg/l.

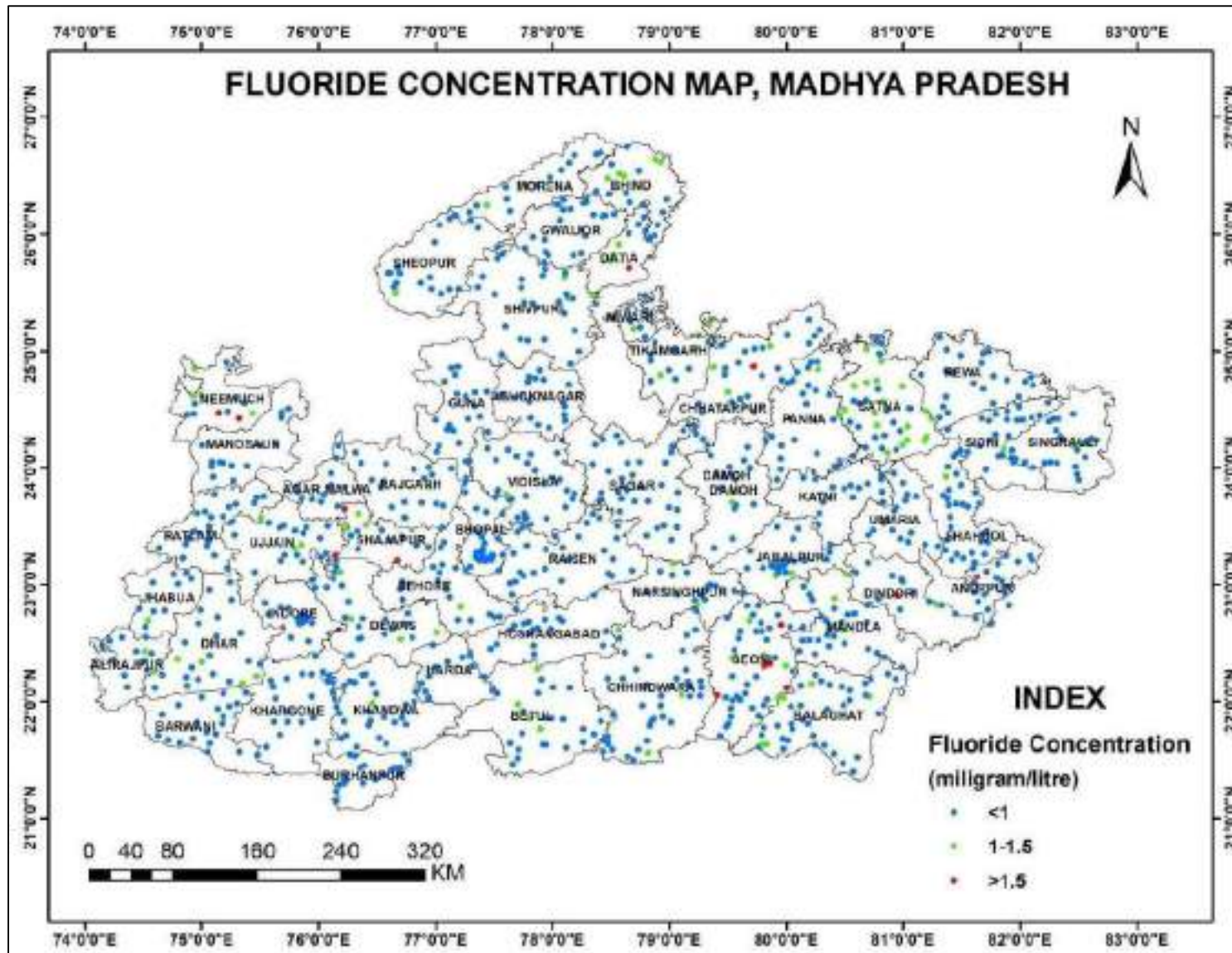


Fig 3.12: Fluoride Concentration in shallow aquifer, Madhya Pradesh

### 3.8.3 Nitrate

Undesirable changes in the natural quality of ground water due to anthropogenic activities of man are a matter of great concern. The contribution of atmospheric and geological sources for Nitrate in ground water is small in comparison to the sources related to pollution as a result of activities of man. Sewage and animal waste contain considerable amount of Nitrate and its discharge on land & subsequent leaching by rainfall causes enrichment of Nitrate in ground water. Similarly, agricultural sources such as excessive use of fertilizers, irrigation with wastewaters, legumes and farm yard wastes contribute nitrate to ground water.

Concentration of nitrate in excess of 45 mg/l in water is harmful for human consumption, particularly for infants as it may cause blue baby disease. The highest desirable and maximum permissible limit of nitrate is 45mg/l (IS: 10500 Drinking water standards). The locations of wells in Madhya Pradesh, where concentration of nitrate ion was more than 45 mg/l in ground water are shown in **Fig 3.13**. Perusal of frequency distribution of nitrate in ground water reveals that 76.29% (872 nos.) of wells have nitrate concentration within the permissible limit of 45mg/l, while 23.71% (271 nos.) well water contain nitrate in excess of 45 mg/l (**Table.3.7**).

**Table 3.7: Frequency distribution of Nitrate in shallow aquifer**

Nitrate Conc. Range (mg/l)	No. of Samples	%
< 45	872	76.29
>45	271	23.71

In Madhya Pradesh, nitrate concentration in Groundwater occurs in Agar Malwa, Alirajpur, Ashok Nagar, Balaghat, Barwani, Betul, Bhind, Bhopal , Burhanpur , Chhatarpur, Chhindwara, Damoh, Dewas, Dhar, Gwalior, Harda, Hoshangabad , Indore, Jabalpur, Jhabua, Katni, Khandwa, Khargone, Mandla, Mandsaur, Morena, Narsimhapur, Panna, Raisen, Rajgarh, Ratlam, Rewa, Sagar, Satna, Sehore, Seoni, Shahdol, Shajapur, Sheopur, Shivpuri, Sidhi, Tikamgarh, Ujjain, Umaria and Vidisha districts. The distribution of nitrate concentration in the State is shown in **Fig 3.13**. Very high nitrate concentration of 276 mg/l was found in the ground water sample from Bhagwara of Sheopur district.



### 3.8.4 Total Hardness

Hardness is mainly caused by the presence of Calcium and Magnesium Bicarbonate, Sulphate and Chloride ions. As per Bureau of Indian Standard IS:10500: 2012 (Drinking water), the desirable limit of total hardness is 200 mg/l and permissible limit is 600 mg/l. Total Hardness in the shallow ground water in Madhya Pradesh ranges between 10 to 1485 mg/l (1485 mg/l in Dongarpur, Gwalior district). Most of the waters are calcium bicarbonate type attributing to temporary hardness of water. Permanent hardness of water caused by Calcium and Magnesium, Sulphate and Chloride can be removed by ion exchange.

**Table 3.8: Frequency distribution of Total Hardness in shallow aquifer**

Total Hardness Range (mg/l)	No. of Samples	%
<200	261	22.83
200-600	829	72.53
>600	53	4.64

The study of Total Hardness in ground water reveals that 53 nos. (5.20%) of well waters contain hardness more than the permissible limit of 600 mg/l and 829 nos. (72.53%) of well has total hardness above the desirable limit of 200 mg/l but below the permissible limit of 600 mg/l (Table.3.8).

### 3.8.5. Suitability for Irrigation

The crop productivity depends on the quality of the water used for irrigation. Water suitability for irrigation needs to be evaluated on the basis of hazards it can create in the soil, affecting yield & quality of crops. The potential hazards to crop growth are salinity, sodicity, alkalinity and toxicity.

### 3.8.6 Sodium absorption Ratio

Sodium Adsorption Ratio (SAR) is an estimate of the degree to which Sodium will be absorbed by soil from water. Sodium in irrigation, waters adversely affects soil structure and permissibility by replacing Ca and Mg ions.

$$SAR = \frac{Na^+}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}}$$

Where: Na<sup>+</sup>, Ca<sup>+2</sup> and Mg<sup>+2</sup> is expressed in meq/l

**Table 3.9: Quality of Water on the basis of SAR values**

SAR values	Sodium hazard class	Sample	% of samples	Remark
<10	S1	1130	98.86	Excellent
10 to 18	S2	12	1.05	Good
19 - 26	S3	1	0.09	Doubtful/fair poor

SAR values	Sodium hazard class	Sample	% of samples	Remark
>26	S4 and S5	0	0.00	Unsuitable

**Table 3.9** shows that the quality of water samples as per SAR is good as 98.86% (1130 nos.) wells have SAR value below 10.

### 3.8.7 Residual Sodium Carbonate

Residual Sodium Carbonate (RSC): Equals the sum of bicarbonate and Carbonate ion concentration minus the sum of Calcium & Magnesium ions, when all the ions are expressed in meq/l.

$$RSC = (CO_3^{2-} + HCO_3^-) - (Ca^{++} + Mg^{++})$$

According to Eaton (1950) and USSL (1954), irrigation waters containing residual sodium carbonate (RSC) above 2.5 meq/l are not suitable for irrigation purpose. Water containing 1.25 to 2.5 meq/l of RSC is marginally suitable & those containing less than 1.25 meq/l of RSC are safe. The water quality of Madhya Pradesh has been evaluated on the basis of RSC in in **Table 3.10**.

**Table 3.10: Number of wells falling in different RSC ranges**

RSC (epm)	No of samples	% of samples	Indication	Remark on quality
<1.25	958	83.81	Can be used safely	Good
1.25 - 2.50	100	8.75	Can be used with certain management	Doubtful
>2.50	85	7.44	Unsuitable for irrigation purposes	Unsuitable

Nearly 93 % (1058 Nos.) of dug well waters of Madhya Pradesh were found to have RSC values below 2.5 meq/l, which infers that the water is free from alkalinity hazards. However, 7.4 % (85 Nos.) of wells have RSC more than 2.5 meq/l. Excessive use of these high RSC waters for irrigation can adversely affect fertility of the soil in the area by making it alkaline, resulting at times in hardening of the soil due to deposition of sodium carbonate. For safe use of such waters gypsum requirement for different soils needs to be evaluated.

Maximum and minimum values and values exceeding desirable and permissible limit for drinking use of different parameters is shown in the **Table 3.11**.

**Table 3.11: showing maximum and minimum values and values exceeding desirable and permissible limit for drinking use of different parameters**

	<b>BIS (desirable limit)</b>	<b>BIS (permissible limit)</b>	<b>Range of values (Min)</b>	<b>Range of values (Max)</b>	<b>Average</b>	<b>No. of samples exceeding desirable limit</b>	<b>% samples exceeding desirable limit</b>	<b>No. of samples exceeding permissible limit</b>	<b>% samples exceeding permissible limit</b>
<b>pH</b>	6.5	8.5	6.54	8.30	7.65	0	0	0	0
<b>TDS</b>	500	2000	120	2919	644	713	62	11	1
<b>Total Hardness</b>	200	600	10	1485	303	815	71	53	5
<b>Ca</b>	75	200	2	516	85	497	43	47	4
<b>Mg</b>	30	100	1	146	22	106	9	1	0
<b>Cl</b>	250	1000	10	937	111	102	9	0	0
<b>S04</b>	200	400	4	189	22	0	0	0	0
<b>N03</b>	45	No relaxation	0	276	35	271	24	271	24
<b>F</b>	1	1.5	0.00	1.95	0.51	105	9	15	1
<b>Total Alkalinity</b>	200	600	24	1885	341	922	81	53	5

## **CHAPTER 4**

### **4.0 COMPUTATION OF GROUND WATER RESOURCE**

The Dynamic ground water resources (as in 2023) of Madhya Pradesh have been assessed jointly by Central Ground Water Board, North Central Region, Bhopal and Ground Water Survey, Water Resource Department, Govt. of Madhya Pradesh under the supervision of State Level Committee. The dynamic ground water resources are also known as Annual Ground Water Recharge, since it gets recharged every year from rainfall and other sources (secondary sources) such as applied irrigation water, surface water bodies, water conservation structures, etc. Methodology adopted for the assessment has been outlined in **Chapter 2** of this report. This section provides a summary of the Ground Water Resources Assessment 2023 (GWRA-2023) made for the state. Data of rainfall, ground water structures, canal, tanks ponds etc. are collected of five years from 2018 to 2022. The water level data are used from 2013 to 2022.

### **4.1 ASSESSMENT UNITS**

In the current assessment year, the ground water resources have been computed for all 317 assessment units (313 administrative blocks and 4 urban areas i.e Bhopal, Indore, Gwalior and Jabalpur.) of Madhya Pradesh.

The following sub-units are taken into account for the computation of various figures in the methodology and have been considered as given below: -

#### **4.1.1 Hilly Area**

This sub-unit comprises of all portions of ground water assessment unit which have slopes greater than 20%. This sub-unit is characterized by more runoff and less ground water recharge, and hence has been excluded for ground water recharge computation.

#### **4.1.2 Poor Ground Water Quality Area**

There is no clear cut demarcated area of poor quality in the State for computation of ground water resources. Apart from this, statistical data of ground water structure is also not available. Hence this unit has not been considered for resource estimation.

#### **4.1.3 Command and Non-Command Area**

In the methodology, it is recommended that dynamic ground water resources estimation should be carried out for command area and non-command area separately. This has been followed. For computation of ground water resources of command area only medium and major command areas have been considered.

Block-wise total geographical areas, hilly area, command area, non-command area and area worthy for ground recharge are given in **Annexure I**, whereas district-wise geographical areas,

hilly area, command area, non-command area and area worthy for ground recharge are shown in Table 4.1.

**Table 4.1: District wise Area Details**

S.N.	District	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non-Command Area	Total		
1	Agar Malwa	11375	240201	251576	20617	272193
2	Alirajpur	0	305400	305400	26400	331800
3	Anuppur	0	294200	294200	78200	372400
4	Ashoknagar	20650	441594	462244	5150	467394
5	Balaghat	101503	790290	891793	31107	922900
6	Barwani	68712	298119	366831	175369	542200
7	Betul	26248	830202	856450	147850	1004300
8	Bhind	179891	266009	445900	0	445900
9	Bhopal	0	264800	264800	12437	277237
10	Burhanpur	11289	245761	257050	66250	323300
11	Chhatarpur	116640	673794	790434	78302	868736
12	Chhindwara	13311	871466	884777	296723	1181500
13	Damoh	57667	416952	474619	255981	730600
14	Datia	132097	134103	266200	2900	269100
15	Dewas	18544	558538	577082	125002	702084
16	Dhar	149070	663570	812640	2660	815300
17	Dindori	0	456000	456000	116500	572500
18	Guna	37209	580305	617514	21486	639000
19	Gwalior	131133	297167	428300	28100	456400
20	Harda	79150	190940	270090	62910	333000
21	Hoshangabad	253623	304729	558352	112048	670400
22	Indore	5376	376521	381897	7903	389800
23	Jabalpur	80876	362992	443868	78225	522093
24	Jhabua	17018	294235	311253	34747	346000
25	Katni	33404	433244	466648	22752	489400
26	Khandwa	92560	488886	581446	171004	752450
27	Khargone	156918	499979	656897	146103	803000
28	Mandla	31070	542920	573990	180410	754400
29	Mandsaur	74088	421552	495640	57366	553006
30	Morena	224789	213700	438489	58400	496889
31	Narsinghpur	52769	426331	479100	34200	513300
32	Neemuch	17976	357768	375744	44300	420044
33	Niwari	12830	139732	152562	3900	156462
34	Panna	32712	629763	662475	51025	713500
35	Raisen	58600	602340	660940	185700	846640
36	Rajgarh	0	615498	615498	0	615498

S.N.	District	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non-Command Area	Total		
37	Ratlam	8614	452986	461600	24500	486100
38	Rewa	85364	508396	593760	37600	631360
39	Sagar	40053	885365	925418	99782	1025200
40	Satna	47108	624998	672106	79910	752016
41	Sehore	95559	368413	463972	193828	657800
42	Seoni	71956	733064	805020	70780	875800
43	Shahdol	5047	492753	497800	86300	584100
44	Shajapur	0	340617	340617	6708	347325
45	Sheopur	71150	462330	533480	127120	660600
46	Shivpuri	69421	907628	977049	50751	1027800
47	Sidhi	48890	311515	360405	124995	485400
48	Singrauli	6602	444658	451260	115940	567200
49	Tikamgarh	26862	308676	335538	12800	348338
50	Ujjain	0	593933	593933	19090	613023
51	Umaria	0	421900	421900	32000	453900
52	Vidisha	76287	594483	670770	66330	737100
<b>State Total (Ha)</b>		<b>2952011</b>	<b>23981316</b>	<b>26933327</b>	<b>3890461</b>	<b>30823788</b>
<b>State Total (Sq. Km)</b>		<b>29520.11</b>	<b>239813.16</b>	<b>269333.3</b>	<b>38904.61</b>	<b>308237.9</b>

## 4.2 GROUND WATER RESOURCES OF MADHYA PRADESH

Groundwater resources of Madhya Pradesh State have been computed according to Methodology and norms described in **Chapter 2**. The assessment wise details have been provided in **Annexure (I to IV)**. The Salient features of the computations are given below.

### 4.2.1 Recharge from Rainfall

Recharge from rainfall has been computed separately for monsoon and non-monsoon periods as well as for command and non-command areas. Recharge from rainfall is mainly a function of geographical area of the district, normal monsoon rainfall and lithology of the area.

The recharge from rainfall during monsoon season has been computed using Water Level Fluctuation Method and Rainfall Infiltration Factor Method, whereas recharge from rainfall during non-monsoon period has been computed using Rainfall Infiltration Factor Method. Details of the Assessment unit-wise monsoon and non-monsoon Rainfall recharge have been given in **Annexure II**. District-wise recharge from rainfall is given in **Table.4.2**.

Non-monsoon rainfall recharge is taken into account in Annupur, Balaghat, Betul, Burhanpur, Chhindwara, Dindori, Mandla, Rewa, Satna, Seoni, Shahdol, Sidhi and Umaria districts, where non monsoon rainfall is more than 10% of the total annual rainfall. Total recharge from rainfall

in the State is of the order of 2707390 ham (27.07 bcm) which is approximately 76% of the total annual ground water recharge (**Fig 4.1**) with Hoshangabad district having the highest rainfall recharge of 130456 ham and Niwari district has minimum rainfall recharge of the order of 14460 ham.

#### **4.2.2 Recharge from Other Sources**

Total Recharge to ground water has several components, rainfall being the major one. The other component include seepage from canals, return flow from surface water irrigation, return flow from ground water irrigation, seepage from Tanks and Ponds, recharge from water conservation structures and in urban areas recharge from pipeline leakages for command area. For non-command area seepage from canals and return flow from surface water irrigation is not applicable. Assessment wise recharge from other sources has been given in **Annexure II**. District- wise recharge from other sources is given **Table 4.2**. Component of recharge from other sources is highest in Khandwa district (56943 ham) where maximum canal irrigation facility is available. Lowest value of recharge from other source is recorded in Anuppur (601 ham) and Dindori (907 ham). Total recharge from rainfall is 2707390 ham (27.07 bcm) whereas from other sources is 840018 ham (8.4 bcm). Assessment wise recharge from canals, surface water irrigation, ground water irrigation, seepage from Tanks and Ponds, water conservation structures and pipelines has been given in **Annexure III**. District- wise recharge from canals, surface water irrigation, ground water irrigation, seepage from Tanks and Ponds, water conservation structures and pipelines is given **Table 4.3**. The Ground Water Recharge from other resources scenario is shown in the **Fig.4.2**.

#### **4.2.3 Recharge from All Sources**

The overall contribution of rainfall (both monsoon & non-monsoon) recharge to state's total annual ground water recharge is 76 % and the share of recharge from 'Other sources' viz. canal seepage, return flow from irrigation, recharge from tanks, ponds and water conservation structures taken together is 24 % (**Fig 4.1**). The district wise comparison rainfall recharge and recharge from other sources is prepared and presented in **Fig.4.4** and district wise recharge from 'Other sources' viz. canal seepage, return flow from irrigation, recharge from tanks, ponds and water conservation structures is shown in **Fig.4.5**. Total replenishable ground water resources including rainfall recharge and recharge from other sources have been computed on assessment- wise and by adding up assessment wise figures of the respective districts which is presented in **Annexure II** and **Table. 4.2**. Total annual recharge from all sources in the State is of the order of 3547408.4 ham (35.47 bcm), with Hoshangabad district having the highest recharge of 179274 ham and Niwari district has minimum recharge of the order of 19644 ham.

Volumetric estimates are dependent on the areal extent of the assessment units. In order 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 recharge worthy area of the respective assessment units (km<sup>2</sup>). Spatial variation in annual ground water recharge (m) is shown in **Fig 4.6**.

#### **4.2.4 Unaccounted Natural Discharge and Annual Extractable Ground Water Resource**

The total annual ground water recharge of the area is the sum of monsoon and non-monsoon recharge. An allowance of 5% of total annual ground water recharge has been kept for natural discharge in the non-monsoon season, recharge is considered of WLF method is employed to compute rainfall recharge during monsoon season otherwise 10%. The balance ground water available accounts for existing net ground water availability for various uses and potential for future development. Assessment wise unaccounted natural discharge and Annual Extractable Ground Water Resource is given in **Annexure II** whereas district wise unaccounted natural discharge and Annual Extractable Ground Water Resource is given in **Table 4.2**. Total unaccounted natural discharge in the State is of the order of 262033 ham (2.62 bcm) with Hoshangabad district having the highest discharge of 15577 ham and Niwari district with lowest of 1523 ham. The total natural discharge in the state is about 7% of the total annual Groundwater recharge (**Fig 4.3**). The Annual Extractable Ground Water Resource in the state is 3285375 ham (32.85 bcm) with Hoshangabad district having the highest Annual Extractable Ground Water Resource of 163696 ham and Niwari with lowest of 18120 ham. The Annual Extractable Ground Water Resource in the state which is 93% of the total annual Groundwater recharge (**Fig 4.3**).

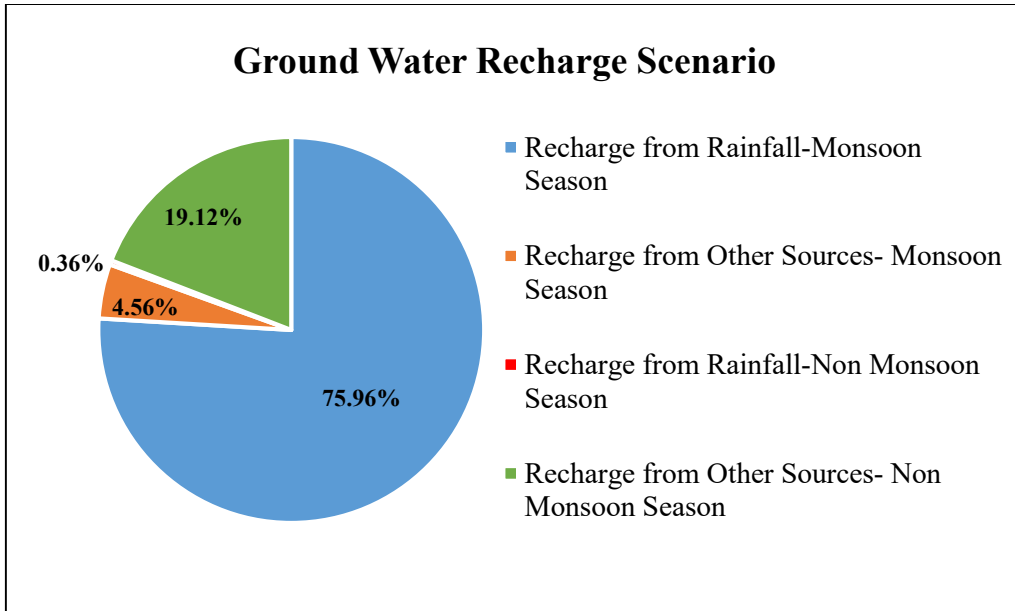


Fig. 4.1: Ground Water Recharge Scenario, Madhya Pradesh

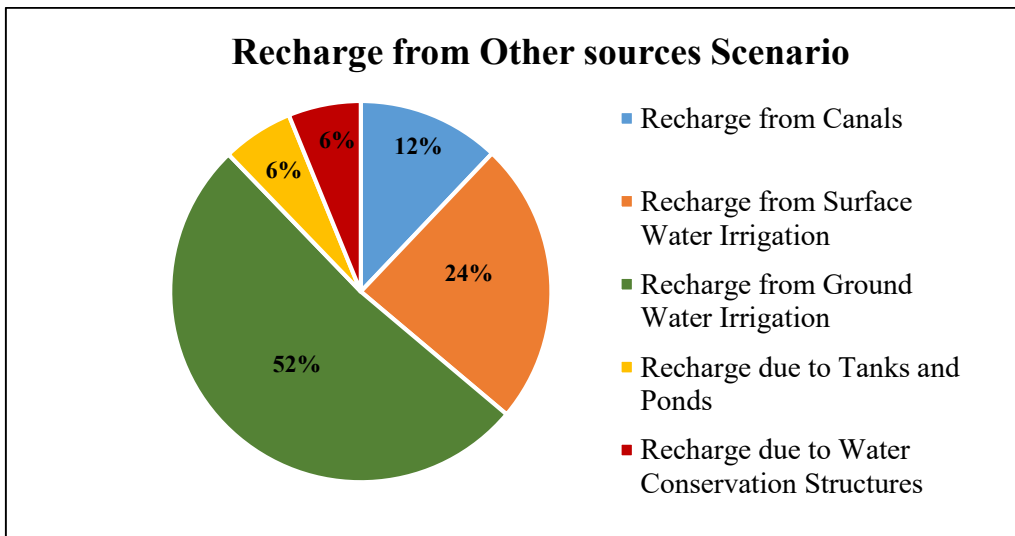


Fig. 4.2: Recharge from other Sources Scenario, Madhya Pradesh

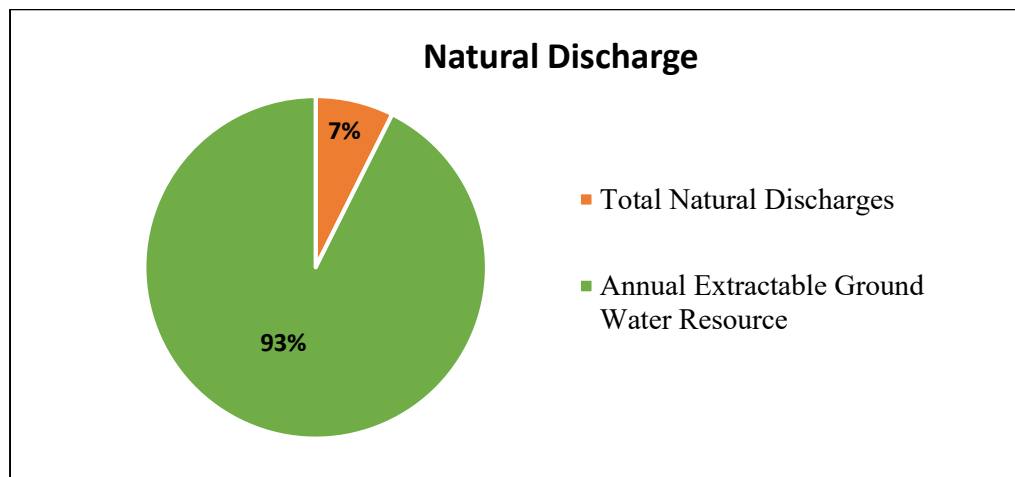


Fig. 4.3: Natural Discharge Vs Total Recharge

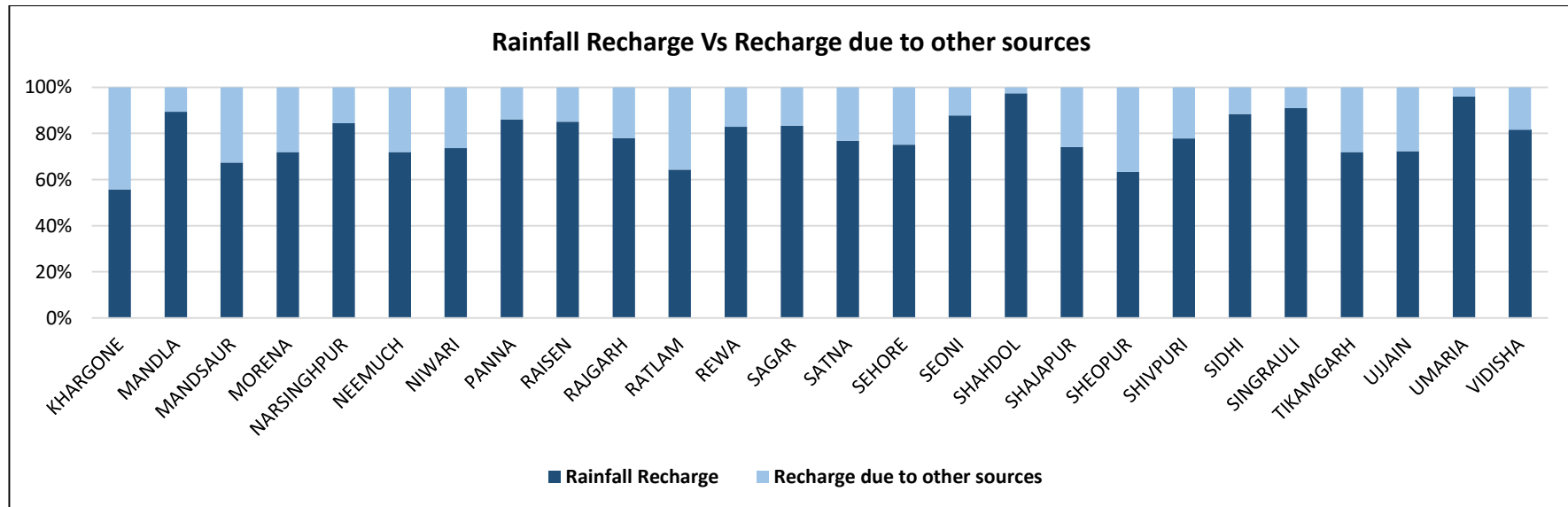
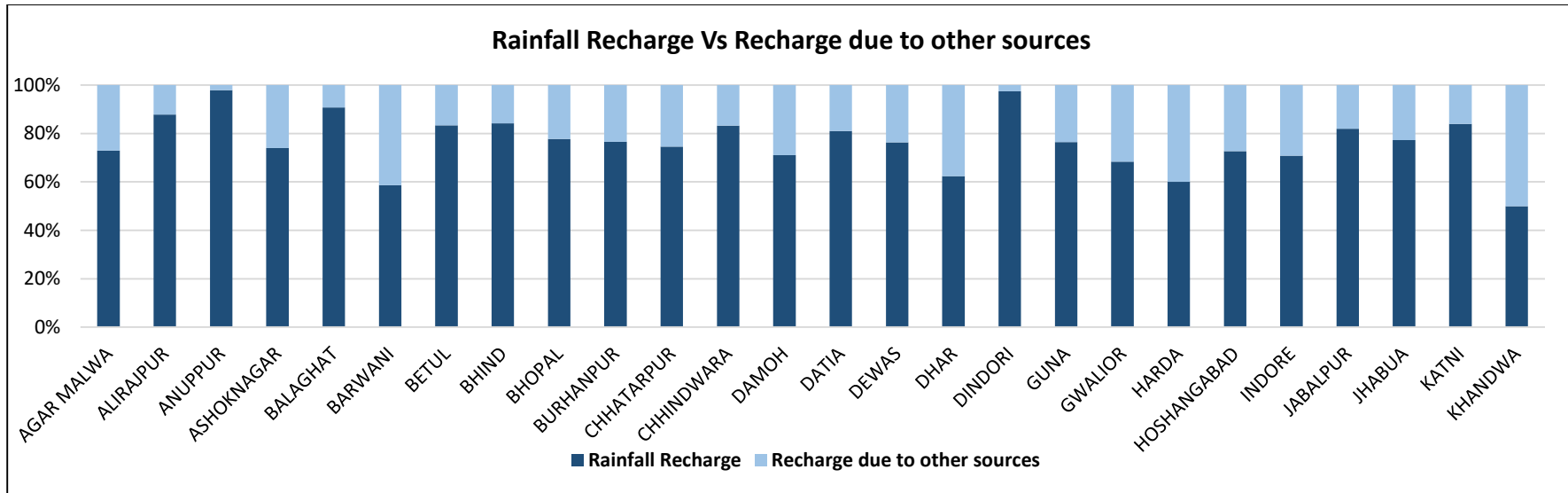


Fig.4.4: District wise Rainfall Recharge Vs Recharge from Other Sources

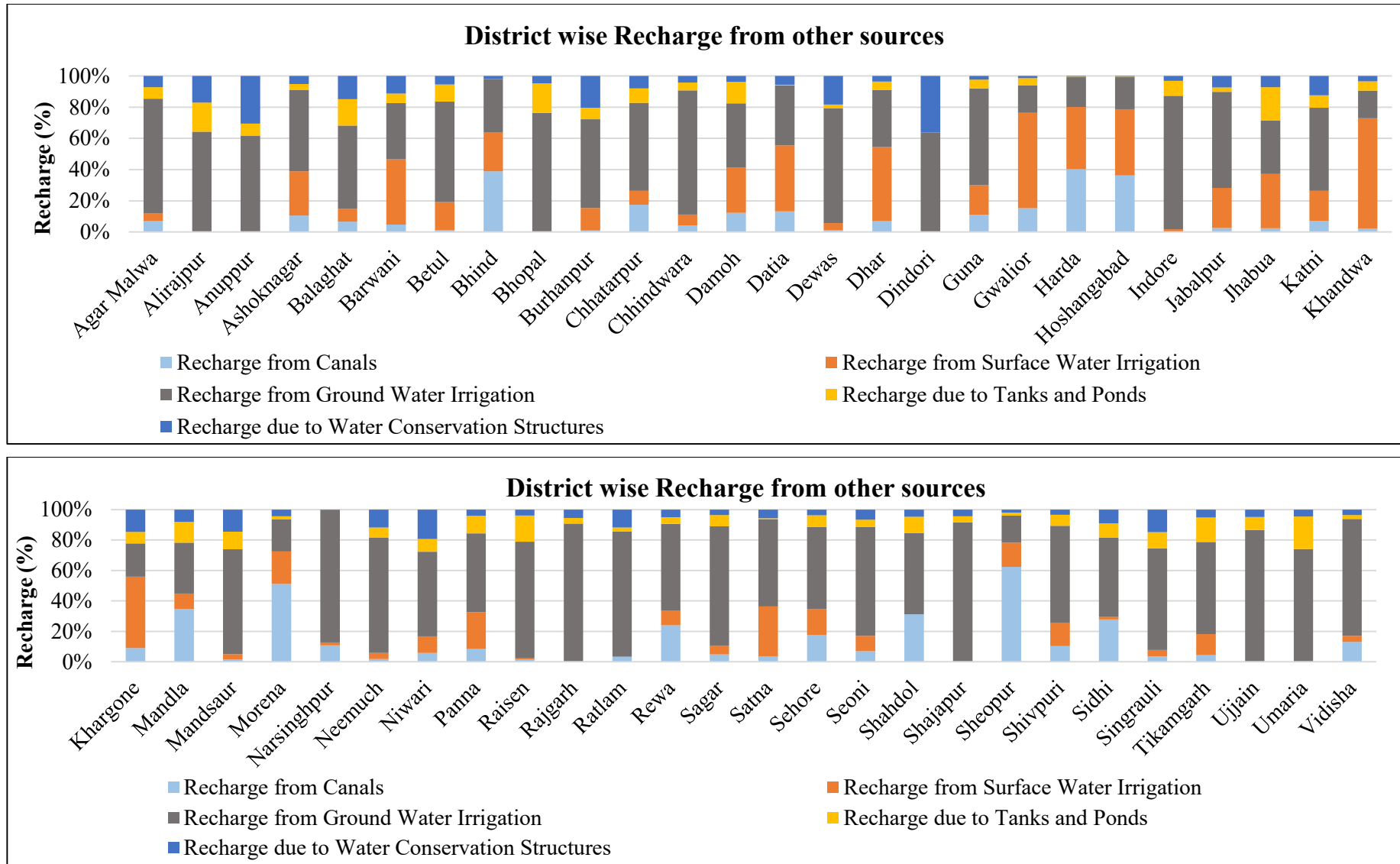


Fig.4.5: Comparison of District wise Recharge from other resource

Table 4.2 District wise Recharge, Madhya Pradesh

S. N.	District	Ground Water Recharge (ham)				Total Annual Ground Water Recharge	Total Natural Discharges (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	Agar Malwa	31757.01	2604.03	0	9187.76	43548.8	3145.59	40403.21
2	Alirajpur	18876.87	770.93	0	1842.27	21490.07	1559.87	19930.2
3	Anuppur	26118.32	200.17	2107.1	400.77	28826.36	1832.62	26993.74
4	Ashoknagar	29228.49	2196.8	0	8067.76	39493.05	2668.71	36824.34
5	Balaghat	69810.74	3960.44	224.2	3158.61	77153.99	5204.94	71949.04
6	Barwani	32743.41	3706.25	0	19392.12	55841.78	3805.6	52036.18
7	Betul	85090.59	3707.86	2418.12	13682.15	104898.72	7148.41	97750.31
8	Bhind	82570.26	1679.99	0	13789.97	98040.22	8086.63	89953.59
9	Bhopal	31677.21	2441.93	0	6631.29	40750.43	2801.68	37948.75
10	Burhanpur	27844.06	1986.04	264.63	6586.68	36681.41	2718.56	33962.85
11	Chhatarpur	64676.93	5042.92	0	17041.54	86761.39	5861.63	80899.76
12	Chhindwara	86713.02	4167.05	604.31	13324.36	104808.74	7203.55	97605.19
13	Damoh	27977.31	2179.31	0	9222.16	39378.78	2802.61	36576.17
14	Datia	34922.82	908.75	0	7244.29	43075.86	2953.54	40122.32
15	Dewas	66076.9	5016.1	0	15456.72	86549.72	5605.14	80944.58
16	Dhar	86346.09	6948.91	0	45165.44	138460.44	10693.76	127766.67
17	Dindori	33813.45	277.72	288.23	628.8	35008.2	1750.4	33257.8
18	Guna	62490.49	4340.17	0	14851.05	81681.71	4367.12	77314.59
19	Gwalior	56193.02	7877.46	0	18174.39	82244.87	6471.15	75773.72
20	Harda	28181.73	2916.12	0	15859.07	46956.92	3009.31	43947.6
21	Hoshangabad	130455.74	7570.29	0	41247.63	179273.66	15577.28	163696.36
22	Indore	41623.6	4517.11	0	12608.31	58749.02	5312.66	53436.36

S. N.	District	Ground Water Recharge (ham)				Total Annual Ground Water Recharge	Total Natural Discharges (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			
23	Jabalpur	54728.53	3205.37	0	8795.3	66729.2	5432.37	61296.83
24	Jhabua	20152.36	1230.75	0	4700.23	26083.34	1802.86	24280.48
25	Katni	34347.6	1827.32	0	4750.49	40925.41	2896.22	38029.19
26	Khandwa	56949.53	4252.59	0	52690.25	113892.37	8696.11	105196.25
27	Khargone	54255.99	6263.73	0	36982.82	97502.54	5354.7	92147.84
28	Mandla	43130.31	1059.93	865.06	4178.82	49234.12	2461.69	46772.43
29	Mandsaur	47096.4	5924.83	0	16874.16	69895.39	6713.91	63181.48
30	Morena	50183.87	1569.49	0	18057.95	69811.31	5195.77	64615.54
31	Narsinghpur	104751.62	3201.53	0	15975.25	123928.4	11166.07	112762.33
32	Neemuch	28918.55	2792.12	0	8454.47	40165.14	4016.51	36148.63
33	Niwari	14459.5	1292.7	0	3891.47	19643.67	1523.55	18120.11
34	Panna	47030.15	1424.67	0	6206.71	54661.53	4060.04	50601.49
35	Raisen	79475.6	3545.99	0	10376.31	93397.9	6583.98	86813.92
36	Rajgarh	71614.53	4550.51	0	15698.2	91863.24	5339.02	86524.22
37	Ratlam	54707.36	7371.69	0	22937.37	85016.42	8113.75	76902.67
38	Rewa	44966.31	2007.67	283.37	7324.72	54582.07	4761.11	49820.96
39	Sagar	92434.64	3894.23	0	14470.03	110798.9	8427.56	102371.34
40	Satna	56099.46	2691.5	1151.73	14527.88	74470.57	5452.29	69018.27
41	Sehore	55598.77	3823.16	0	14546.01	73967.94	6473.35	67494.59
42	Seoni	61319.08	2229.07	2284.48	6595.87	72428.5	4034.98	68393.52
43	Shahdol	53203.74	327.6	1305.53	1133.92	55970.79	2798.53	53172.26
44	Shajapur	41301.49	3338.58	0	11063.98	55704.05	4235.84	51468.21
45	Sheopur	35367.05	1089.85	0	19374.62	55831.52	5156.95	50674.57

S. N.	District	Ground Water Recharge (ham)				Total Annual Ground Water Recharge	Total Natural Discharges (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			
46	<b>Shivpuri</b>	66541.87	3838.62	0	15047.29	85427.78	7107.83	78319.96
47	<b>Sidhi</b>	27340.89	799.27	392.3	2837.24	31369.7	2157.43	29212.27
48	<b>Singrauli</b>	33965.21	838.15	0	2519.96	37323.32	1866.17	35457.15
49	<b>Tikamgarh</b>	28753.79	2755.05	0	8434.69	39943.53	3514.7	36428.83
50	<b>Ujjain</b>	72131.6	5918.96	0	21647.62	99698.18	8325.12	91373.06
51	<b>Umaria</b>	34464.53	416.86	659.44	1032.75	36573.58	2334.23	34239.35
52	<b>Vidisha</b>	74063.34	3153.79	0	13676.72	90893.85	5450	85443.85
	<b>Total (Ham)</b>	<b>2694541.73</b>	<b>161651.93</b>	<b>12848.5</b>	<b>678366.24</b>	<b>3547408.4</b>	<b>262033.4</b>	<b>3285374.93</b>
	<b>Total (Bcm)</b>	<b>26.95</b>	<b>1.62</b>	<b>0.13</b>	<b>6.78</b>	<b>35.47</b>	<b>2.62</b>	<b>32.85</b>

Table 4.3: District wise Recharge from other source components

S.N.	District	Recharge from Canals (Ham)	Recharge from Surface Water Irrigation (Ham)	Recharge from Ground Water Irrigation (Ham)	Recharge due to Tanks and Ponds (Ham)	Recharge due to Water Conservation Structures (Ham)	Recharge due to Pipelines (Ham)	Total Recharge from Other Sources (Ham)
1	Agar Malwa	822.45	575.21	8666.67	883.32	844.14	0.00	11791.79
2	Alirajpur	0	0	1680.59	486.63	445.99	0.00	2613.21
3	Anuppur	0	0	370.89	46.48	183.57	0.00	600.94
4	Ashoknagar	1078.16	2912.64	5345.35	404.31	524.08	0.00	10264.54
5	Balaghat	476.37	573.54	3800.71	1212.68	1055.76	0.00	7119.06
6	Barwani	1078.61	9670.01	8344.33	1402.6	2602.84	0.00	23098.39
7	Betul	221.91	3097.01	11205.93	1909.74	955.43	0.00	17390.02
8	Bhind	6027.16	3860.51	5279.54	1.15	301.59	0.00	15469.95
9	Bhopal	0	0	5979.09	1490.14	369.38	1234.61	9073.22
10	Burhanpur	83.95	1240.89	4865.79	634.35	1747.72	0.00	8572.70
11	Chhatarpur	3858.06	1977.59	12434.66	2039.58	1774.57	0.00	22084.46
12	Chhindwara	708.57	1234.68	13928.52	867.38	752.26	0.00	17491.41
13	Damoh	1403.38	3311.6	4689.42	1568.61	428.50	0.00	11401.51
14	Datia	1081.84	3437.69	3144.21	26.34	462.96	0.00	8153.04
15	Dewas	267.81	884.88	15089.34	468.89	3761.90	0.00	20472.82
16	Dhar	3624.05	24737.15	19072.12	2826.52	1854.48	0.00	52114.32
17	Dindori	0	0	579.02	0	327.50	0.00	906.52
18	Guna	2114.45	3640.06	11902.21	1071.72	462.78	0.00	19191.22
19	Gwalior	3909.53	15623.83	4513.03	1184.57	360.98	459.90	26051.84
20	Harda	7578.09	7456.05	3603.85	53.03	84.18	0.00	18775.20
21	Hoshangabad	17689.76	20742.26	10016.31	125.64	243.93	0.00	48817.90
22	Indore	53.17	224.85	13605.4	1518.02	492.09	1231.88	17125.41

S.N.	District	Recharge from Canals (Ham)	Recharge from Surface Water Irrigation (Ham)	Recharge from Ground Water Irrigation (Ham)	Recharge due to Tanks and Ponds (Ham)	Recharge due to Water Conservation Structures (Ham)	Recharge due to Pipelines (Ham)	Total Recharge from Other Sources (Ham)
23	Jabalpur	291.37	2938.05	7057.8	326.86	839.10	547.50	12000.68
24	Jhabua	138.7	2064.42	2030.54	1266.34	430.98	0.00	5930.98
25	Katni	462.66	1270.17	3503.67	523.27	818.02	0.00	6577.79
26	Khandwa	1143.21	40331.92	10135.4	3336.37	1995.94	0.00	56942.84
27	Khargone	3888.87	20296.09	9431.52	3276.71	6353.34	0.00	43246.53
28	Mandla	1814.45	534.6	1752.07	714.93	422.71	0.00	5238.76
29	Mandsaur	327.6	793.15	15729.71	2643.73	3304.81	0.00	22799.00
30	Morena	10037.27	4177.61	4155.68	390.96	865.91	0.00	19627.43
31	Narsinghpur	2076.27	371.7	16650.35	3.64	74.84	0.00	19176.80
32	Neemuch	201.6	447.56	8518.25	753.44	1325.73	0.00	11246.58
33	Niwari	301.2	569.27	2880.01	428.99	1004.70	0.00	5184.17
34	Panna	641.86	1850.36	3942.77	886.03	310.35	0.00	7631.37
35	Raisen	225.28	91.09	10657	2412.92	535.99	0.00	13922.28
36	Rajgarh	0	0	18387.85	735.88	1125.00	0.00	20248.73
37	Ratlam	1008	19.44	24859.57	850.41	3571.61	0.00	30309.03
38	Rewa	2227.35	889.42	5343.07	409.17	463.41	0.00	9332.42
39	Sagar	889.62	1061.21	14391.62	1363.95	657.85	0.00	18364.25
40	Satna	594.07	5665.9	9854.57	136.58	968.27	0.00	17219.39
41	Sehore	3247.54	3124.33	9896.14	1411.58	689.57	0.00	18369.16
42	Seoni	608.95	897.08	6302.4	424.89	591.63	0.00	8824.95
43	Shahdol	456.58	0	781.14	154.4	69.38	0.00	1461.50
44	Shajapur	0	0	13195.71	571.79	635.06	0.00	14402.56
45	Sheopur	12744.8	3259.29	3650.51	395.05	414.82	0.00	20464.47

S.N.	District	Recharge from Canals (Ham)	Recharge from Surface Water Irrigation (Ham)	Recharge from Ground Water Irrigation (Ham)	Recharge due to Tanks and Ponds (Ham)	Recharge due to Water Conservation Structures (Ham)	Recharge due to Pipelines (Ham)	Total Recharge from Other Sources (Ham)
46	Shivpuri	1941.44	2851.83	12072.17	1377.97	642.50	0.00	18885.91
47	Sidhi	1008.65	71.88	1888.11	339.98	327.90	0.00	3636.52
48	Singrauli	120.77	138.29	2244.94	355.78	498.32	0.00	3358.10
49	Tikamgarh	477.01	1555.09	6785.71	1795.15	576.78	0.00	11189.74
50	Ujjain	0	0	23871.52	2355.38	1339.69	0.00	27566.59
51	Umaria	0	0	1073.75	310.58	65.29	0.00	1449.62
52	Vidisha	2190.09	687.27	12924.79	421.02	607.33	0.00	16830.50
<b>State Total (Ham)</b>		<b>101142.53</b>	<b>201157.47</b>	<b>432085.32</b>	<b>50595.45</b>	<b>51563.47</b>	<b>3473.89</b>	<b>840018.13</b>
<b>State Total (bcm)</b>		<b>1.01</b>	<b>2.01</b>	<b>4.32</b>	<b>0.51</b>	<b>0.52</b>	<b>0.03</b>	<b>8.40</b>

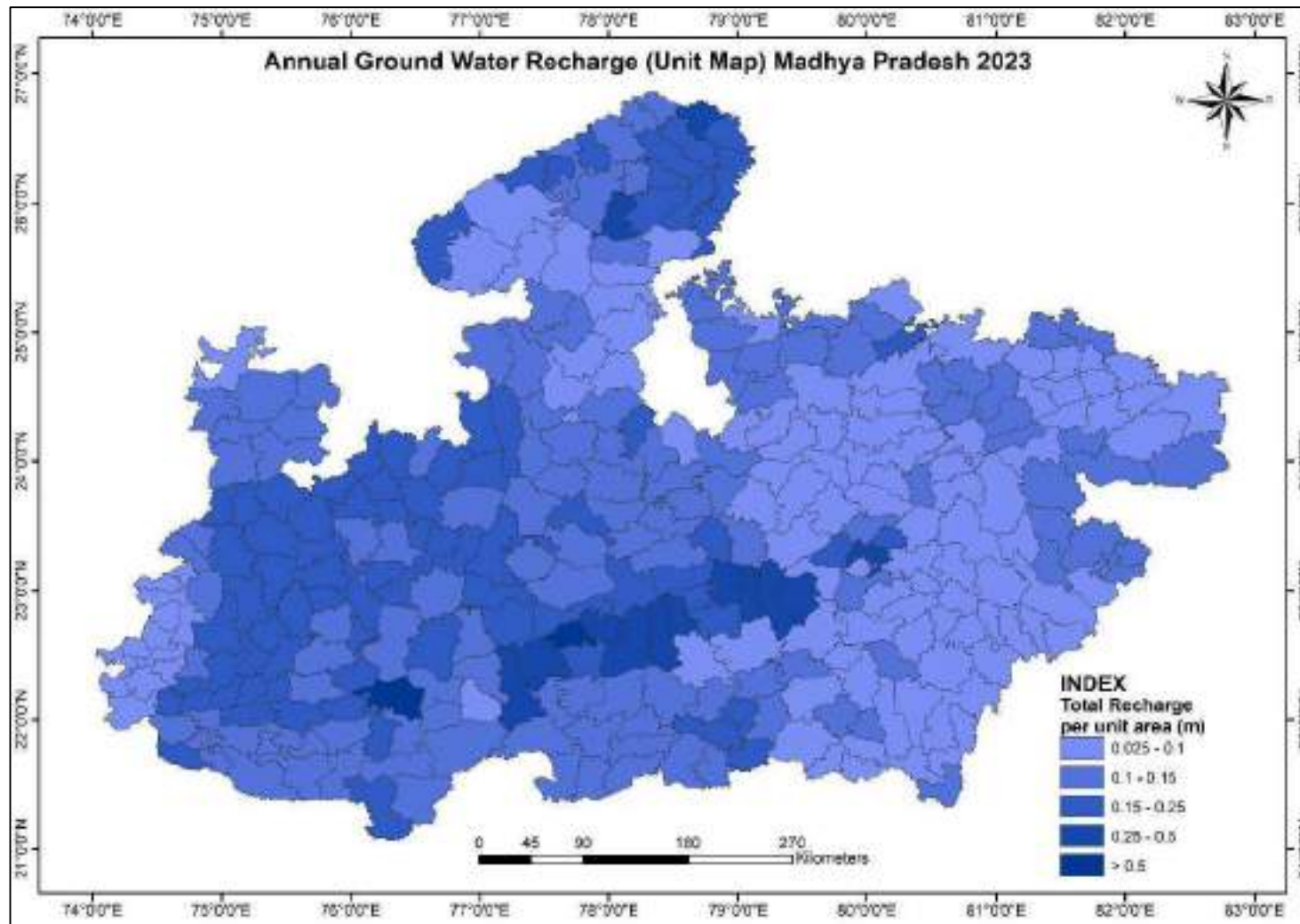


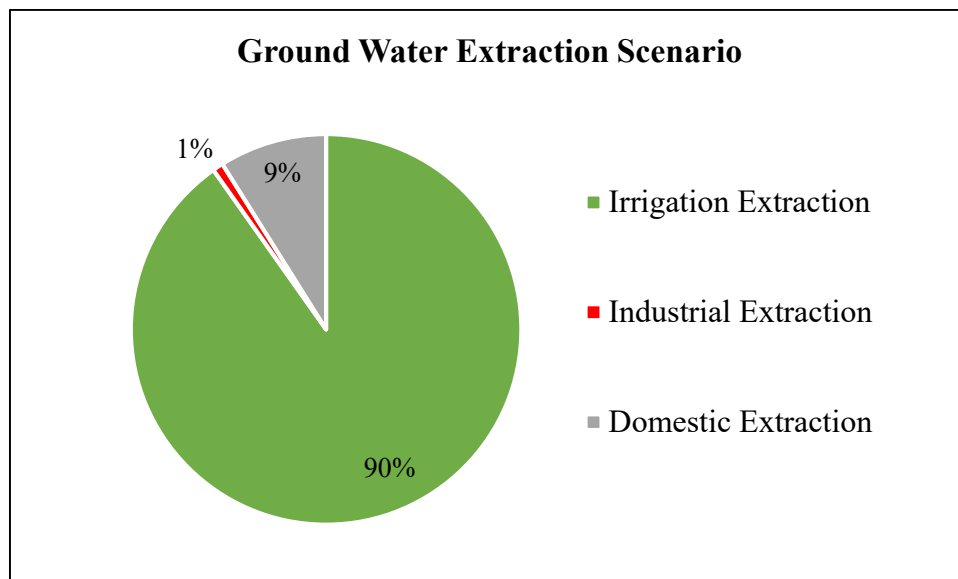
Fig. 4.6: Annual Groundwater Recharge per unit area, Madhya Pradesh

### 4.3 GROUND WATER EXTRACTION FOR ALL USES (DOMESTIC, IRRIGATION AND INDUSTRIAL)

Ground water extraction for various uses has been calculated separately for command and non-command areas. Details of assessment-wise groundwater extraction for various uses are given in **Annexure IV**. District-wise ground water extraction figures are also compiled and given in **Table 4.4**

Total extraction of ground water for all uses in state is calculated as 1930026 ham (19.30 bcm). From the **Table 4.4**, it is seen that maximum ground water extraction for all uses is 103926 ham in Ratlam district and minimum extraction of ground water for all uses is 4165 ham in Dindori district at eastern part of Madhya Pradesh. Comparison of ground water extraction for various uses reveals that extraction for irrigation accounts for more than 90% of total ground water extraction, whereas extraction for domestic is 9% and industrial extraction accounts for meager 1% of the total ground water extraction in the state. (**Fig 4.7**). The district wise comparison of Ground Water extraction from different sources is shown in **Fig.4.8**.

Volumetric estimates are dependent on the areal extent of the assessment units. In order to compare the total ground water extraction of different assessment units, the volumetric estimates of total ground water extraction have been converted to depth units (m) by dividing the total ground water extraction by the area of the respective assessment units (km<sup>2</sup>). Spatial variation in total extraction (m) is shown in **Fig 4.9**.



**Fig.4.7: Ground Water Extraction Scenario**

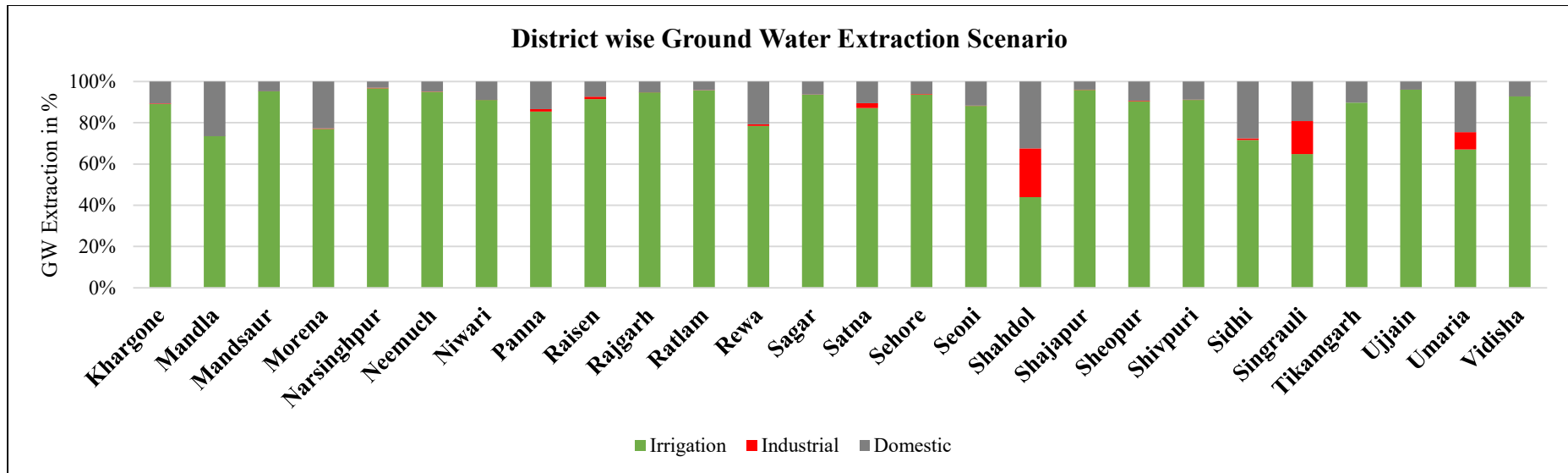
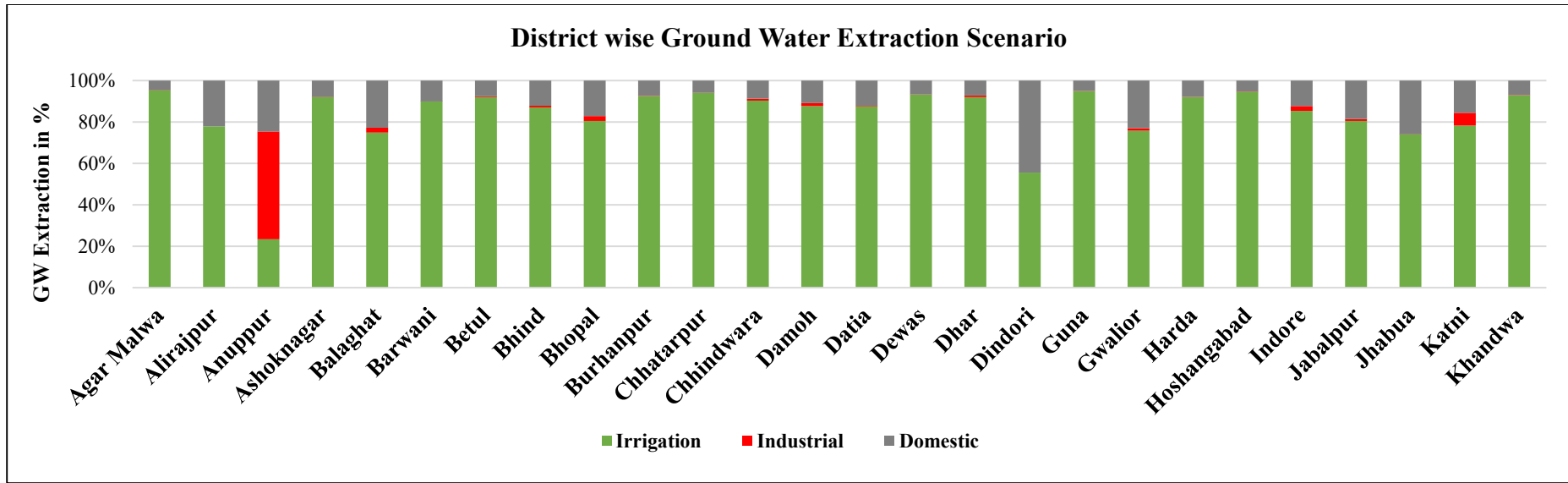


Fig.4.8: District wise Ground Water Extraction Scenario

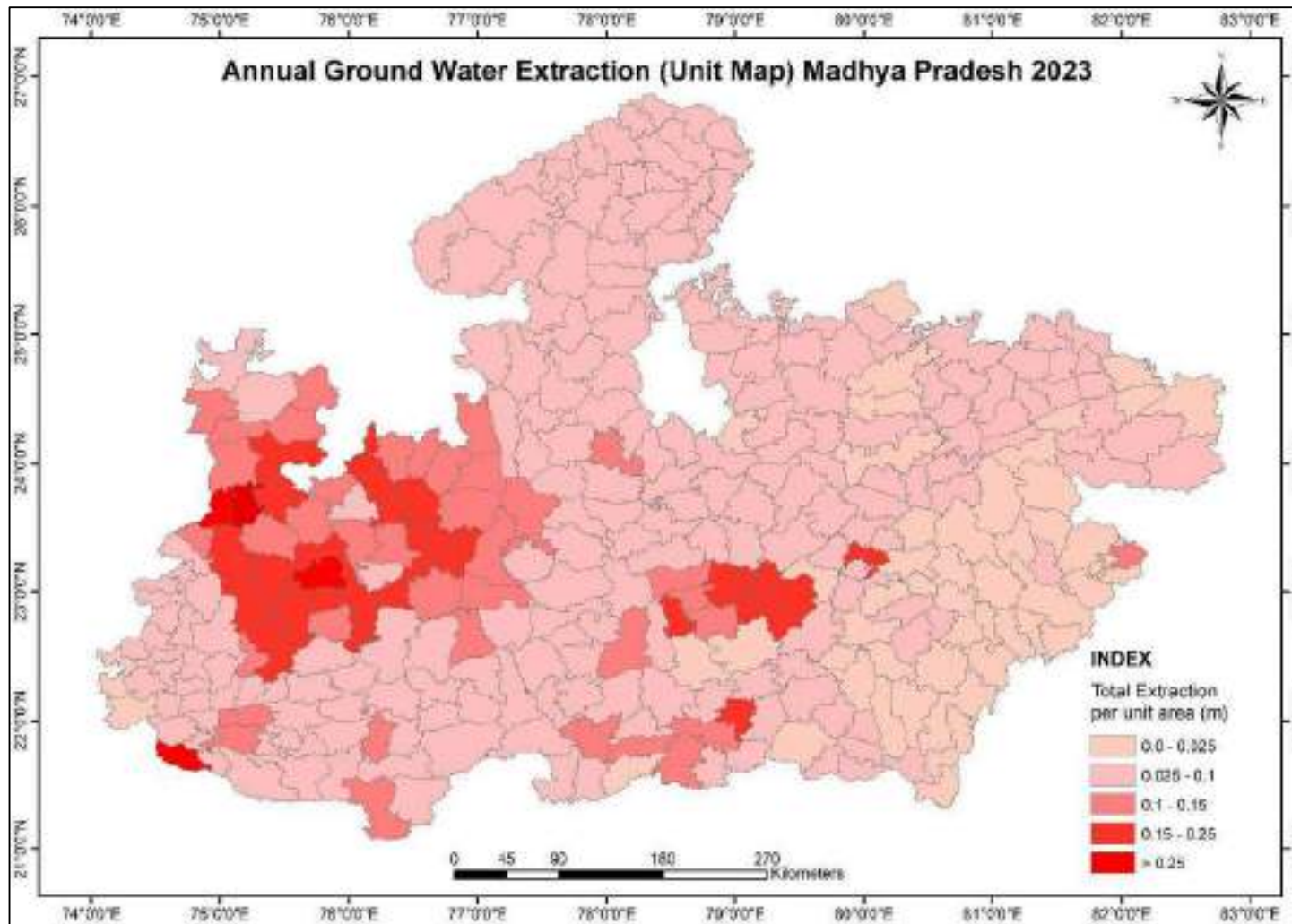


Fig. 4.9: Total Groundwater Extraction per unit area, Madhya Pradesh

Table 4.4: District -wise Ground Water Extraction for Various Uses and Stage of Ground Water Extraction

S. N.	District	Current Annual Ground Water Extraction (ham)				Annual GW Allocation for Domestic use as on 2025 (Ham)	Net Ground Water Availability for future use (ham)	Stage of Ground Water Extraction (%)
		Irrigation	Industrial	Domestic	Total			
1	Agar Malwa	34666.65	3.67	1666.65	36336.96	1766.32	6513.75	89.94
2	Alirajpur	6722.33	0	1910.82	8633.15	2049.42	11158.44	43.32
3	Anuppur	1483.55	3303.32	1562.47	6349.33	1623.03	20583.85	23.52
4	Ashoknagar	21381.39	1.41	1824.21	23207.03	1927.85	13513.68	63.02
5	Balaghat	12657.22	400.93	3851.18	16909.36	4018.37	54872.5	23.5
6	Barwani	33377.29	37.99	3727.85	37143.14	4139.91	19039.54	71.38
7	Betul	44632.8	168.93	3726.52	48528.3	3917.52	49031.02	49.65
8	Bhind	25562.24	248.88	3562.49	29373.62	3758.17	60384.28	32.65
9	Bhopal	23916.38	686.41	5110.13	29712.91	5584.57	7761.4	78.3
10	Burhanpur	21940.49	35.42	1728.73	23704.63	1859.14	10127.82	69.8
11	Chhatarpur	49738.65	79.68	3105.27	52923.58	3324.12	27798.46	65.42
12	Chhindwara	55742.33	580.56	5400.1	61722.98	5674.98	35665.53	63.24
13	Damoh	18757.67	299.37	2331.94	21388.93	2735.18	14784	58.48
14	Datia	12664.84	33.36	1766.56	14464.77	1894.54	25529.57	36.05
15	Dewas	60357.41	95.48	4300.72	64753.63	4579.59	18015.08	80
16	Dhar	76853.59	635.01	6069.37	83557.97	6648.4	55147.1	65.4
17	Dindori	2316.18	0	1848.41	4164.57	1986.42	28955.23	12.52
18	Guna	47608.79	78.24	2532.84	50219.89	2715.98	26911.56	64.96
19	Gwalior	18052.15	270.78	5484.37	23807.29	6003.22	51447.58	31.42
20	Harda	14405.04	16.17	1243.99	15665.19	1330.85	28195.56	35.65
21	Hoshangabad	40065.19	18.64	2251.42	42335.23	2355.8	121256.8	25.86
22	Indore	54421.57	1500.83	7870.51	63792.93	8966.3	2547.06	119.38
23	Jabalpur	25295.9	318.94	5834.34	31449.17	6466.18	29704.16	51.31

S. N.	District	Current Annual Ground Water Extraction (ham)				Annual GW Allocation for Domestic use as on 2025 (Ham)	Net Ground Water Availability for future use (ham)	Stage of Ground Water Extraction (%)
		Irrigation	Industrial	Domestic	Total			
24	Jhabua	8065.63	0.44	2810.21	10876.28	3147.85	13066.56	44.79
25	Katni	14014.73	1116.18	2786.79	17917.68	2996.11	19902.19	47.12
26	Khandwa	40541.57	69.64	3025.19	43636.4	3243.92	61341.13	41.48
27	Khargone	37725.95	78.26	4518.09	42322.26	4866.61	49477.05	45.93
28	Mandla	7008.26	0.07	2537.96	9546.28	2690.49	37073.62	20.41
29	Mandsaur	62918.73	43.65	3105.12	66067.55	3244.75	6601.06	104.57
30	Morena	19963.18	86.34	5881.03	25930.52	6348.42	38217.62	40.13
31	Narsinghpur	72947.95	199.66	2347.59	75495.2	2452.96	37161.76	66.95
32	Neemuch	34072.98	29.85	1769.05	35871.88	1846.2	2846.5	99.23
33	Niwari	11520.12	5.79	1130.38	12656.29	1339.31	5254.88	69.85
34	Panna	15770.99	210.94	2477.82	18459.75	2635.57	31983.99	36.48
35	Raisen	42627.95	548.18	3417.8	46593.92	3727.52	39910.29	53.67
36	Rajgarh	73551.37	11.57	4120.76	77683.72	4534.9	9937.22	89.78
37	Ratlam	99438.31	37.38	4450.12	103925.8	6066.1	2377.85	135.14
38	Rewa	21372.19	185.73	5668.63	27226.55	6185.05	22077.99	54.65
39	Sagar	56806.95	80.78	3807.91	60695.66	4089.76	41393.84	59.29
40	Satna	39418.38	1084.31	4766.96	45269.69	5077.31	25470.08	65.59
41	Sehore	39055.28	117.47	2527.11	41699.87	2714.97	25606.86	61.78
42	Seoni	24964.82	4.91	3328.53	28298.24	3532.72	39891.08	41.38
43	Shahdol	3124.57	1673.31	2307.45	7105.33	2440.47	45933.91	13.36
44	Shajapur	52782.83	54.55	2182.07	55019.46	2288.53	2116.74	106.9
45	Sheopur	17631.34	44.79	1817.82	19493.95	1968.51	31029.92	38.47
46	Shivpuri	48288.67	42.99	4668.71	53000.39	5048.85	24939.43	67.67
47	Sidhi	7552.41	88.26	2908.38	10549.05	3157.52	18414.08	36.11

S. N.	District	Current Annual Ground Water Extraction (ham)				Annual GW Allocation for Domestic use as on 2025 (Ham)	Net Ground Water Availability for future use (ham)	Stage of Ground Water Extraction (%)
		Irrigation	Industrial	Domestic	Total			
48	<b>Singrauli</b>	8979.76	2219.69	2657.3	13856.77	2945.75	21311.92	39.08
49	<b>Tikamgarh</b>	26734.19	0	3074.02	29808.19	3746.52	5948.14	81.83
50	<b>Ujjain</b>	95485.93	57.77	3895.58	99439.27	4104.22	8999.19	108.83
51	<b>Umari</b>	4294.94	540.07	1571.36	6406.36	1714.96	27689.39	18.71
52	<b>Vidisha</b>	51046	13.93	3969.72	55029.63	4260.54	30123.4	64.4
	<b>Total(Ham)</b>	<b>1740326</b>	<b>17460.5</b>	<b>172240.4</b>	<b>1930027</b>	<b>187742.3</b>	<b>1445042</b>	<b>58.75</b>
	<b>Total(Bcm)</b>	<b>17.4</b>	<b>0.17</b>	<b>1.72</b>	<b>19.3</b>	<b>1.88</b>	<b>14.45</b>	<b>58.75</b>

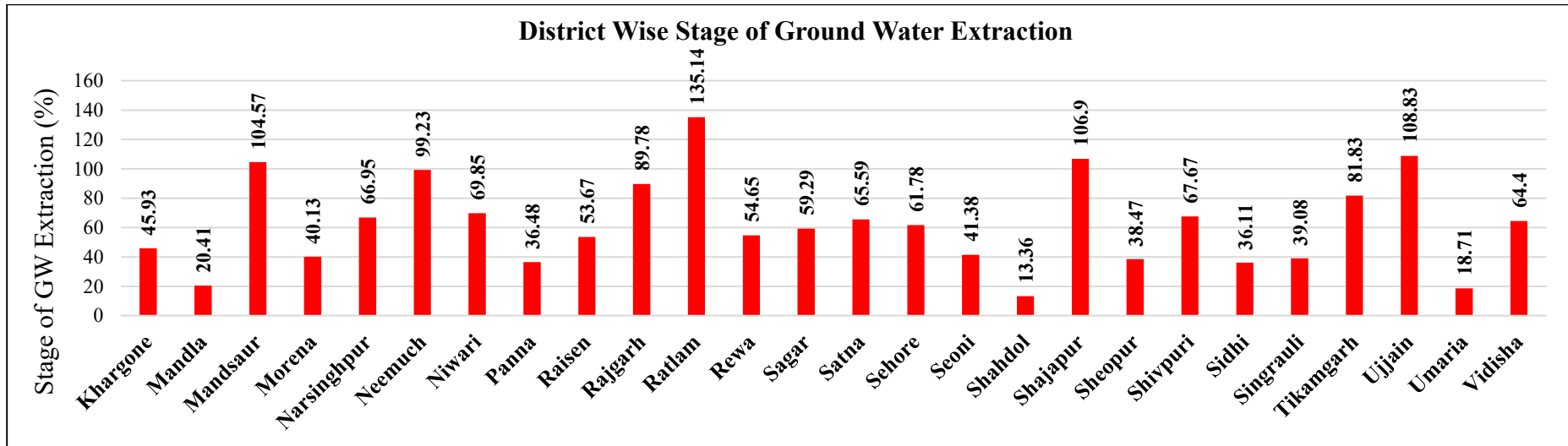
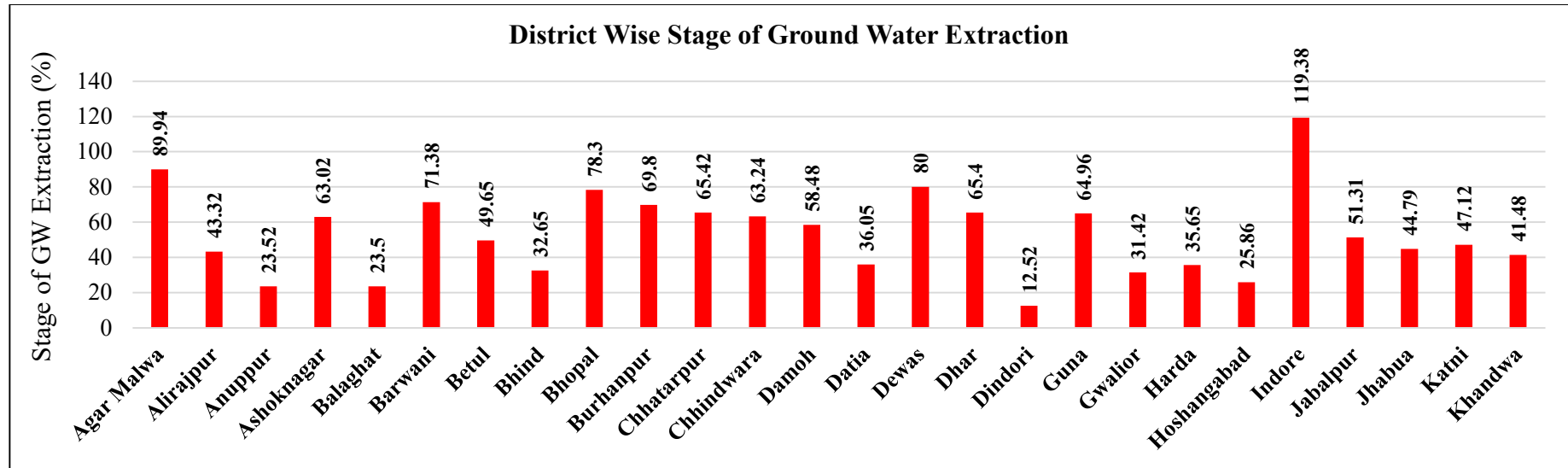


Fig.4.10: District wise Stage of Ground Water Extraction

#### 4.4 STAGE OF GROUND WATER EXTRACTION

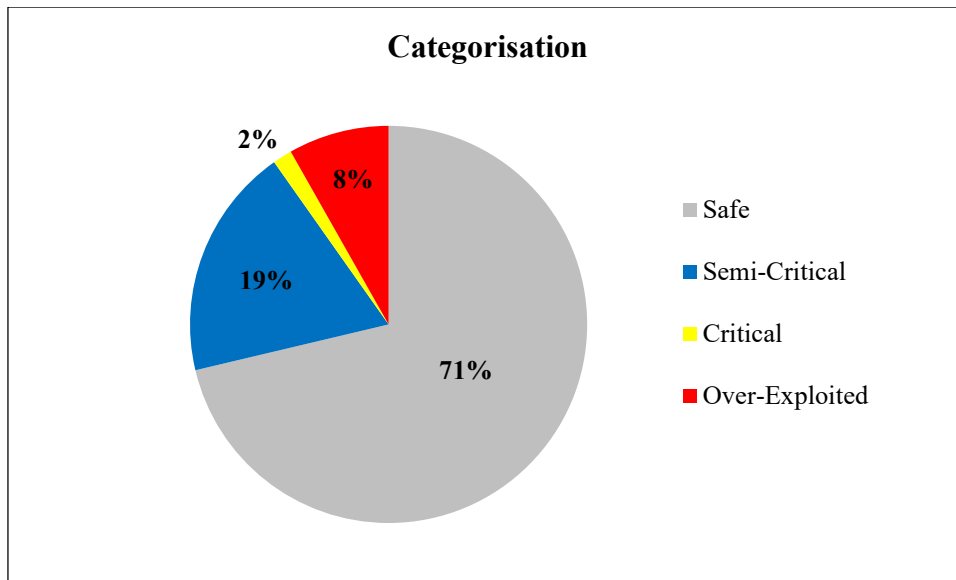
The overall stage of groundwater extraction in the state is 58.75 %. The stage of ground water extraction is very high in the districts of Indore, Mandsaur, Ratlam, Shajapur and Ujjain where it is more than 100%, which implies that in these districts the annual ground water consumption is more than annual extractable ground water resources. In the districts of Agar malwa, Barwani, Bhopal, Dewas, Rajgarh, and Tikamgarh the stage of ground water Extraction is between 70-90%. Neemuch district has stage of ground water extraction between 90 to 100 %. In rest of the districts, the stage of ground water extraction is below 70 %. The Ratlam (135.14%), Indore (119.38%), districts have highest ground water extraction and Dindori with 12.52% is lowest stage of extraction district in state. The district wise stage of Ground Water Extraction is given in the **Table.4.4** and in bar diagram shown in the **Fig.4.10**.

The Jaora block of Ratlam district has highest stage of Ground Water Extraction (170.51%) and the Paraswada block of Balaghat district has lowest stage of Ground Water Extraction (4.63%). The Assessment unit wise stage of Ground Water Extraction is given in **Annexure IV**.

#### 4.5 CATEGORIZATION OF ASSESSMENT UNITS

The distributions of various categorized assessment units are shown in the **Fig 4.12**. 226 blocks are falling under safe category, 60 blocks are falling in semi-critical category, 5 blocks of in critical category, and 26 blocks of the state are categorized as over-exploited. List of safe, semi-critical, critical and over-exploited area is given in **Annexure IV** and in **Annexure V**. Almost all over-exploited blocks are falling in western part of Madhya Pradesh, which is known as “MALWA AREA” where ground water extraction has increased many folds during past decades. In the state out of the total assessment units 8% of units are Over-exploited, 2% units are Critical, 19% of the units are Semi-critical and remaining 71% assessment units are categorized as Safe. (**Fig.4.11**).

Out of 32853.75 mcm of Total Annual Extractable Resources of the state, 3424.26 mcm (10.42 %) are under ‘Over-Exploited’, 537.1 mcm (1.63 %) are under ‘Critical’, 6119.62 mcm (18.63 %) are under ‘Semi-Critical’, 22772.77 mcm (69.32 %) are under ‘Safe’ category assessment units. Category wise annual extractable resources are given in **Table 4.5**. Out of 269333.27 Sq Km of Recharge worthy area of the state, 22554.86 Sq Km (8.37 %) are under ‘Over-Exploited’, 4249.07 Sq Km (1.58 %) are under ‘Critical’, 51803.76 Sq Km (19.23 %) are under ‘Semi-Critical’, 190725.58 Sq Km (70.81%) are under ‘Safe’ category assessment units. Category wise Recharge worthy area is given in **Table 4.6**.



**Figure 4.11: Categorisation of Assessment units**

#### **4.6 ALLOCATION OF GROUND WATER RESOURCES FOR DOMESTIC 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. So the allocation of Ground Water resources for domestic utilization as on 2025 is calculated for all assessment units and given in **Annexure IV** and district wise allocation is given in the **Table 4.4**. It is seen that in Madhya Pradesh 187742 ham (1.88 bcm) ground water resource is allocated for domestic utilization.

#### **4.7 GROUND WATER AVAILABLE FOR FUTURE USE**

Assessment wise, data of Ground Water Available for future use is given in **Annexure-IV**.and district wise are shown in **Table 4.4**. From **Table 4.4**, it is seen that in Madhya Pradesh 1445042 ham (14.45 bcm) ground water is estimated to be available for future use.

#### **4.8 QUALITY TAGGING**

Quality assessment of Ground water is equally important as the quantity assessment. But with the existing network of quality monitoring, it is not possible to categorize the area. There are so many problems in respect to type of attributes, also, some of the attributes are point data which can be considered as varying linearly between two points. Hence for Madhya Pradesh it was decided to add a quality tag to the assessment sub unit. In the state the major sources of quality concern are Salinity and Fluoride. The quality tagged assessment units are given in the **Annexure VI**.

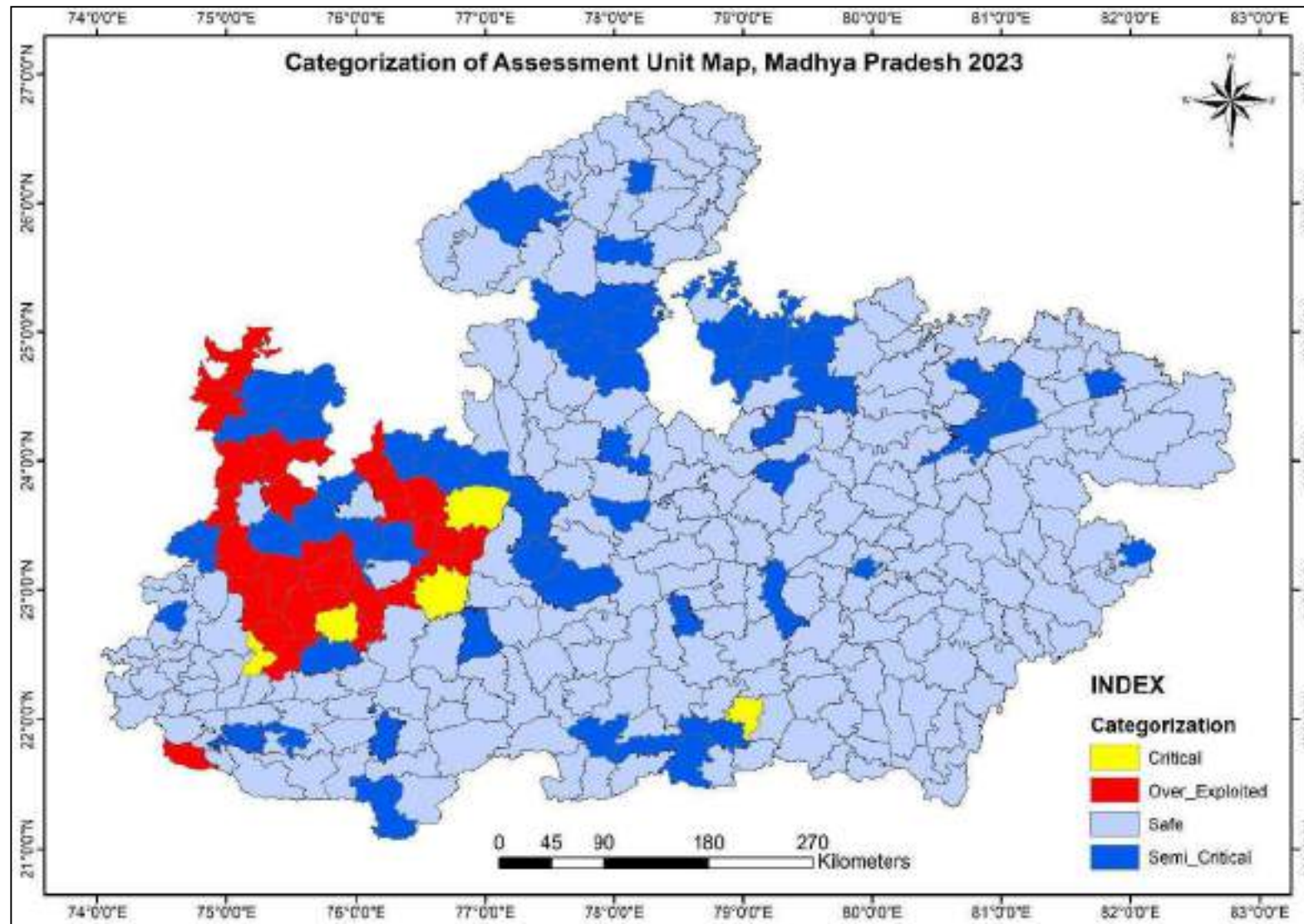


Figure 4.12: Categorisation of Assessment units in Madhya Pradesh

**Table 4.5: Category wise Annual Extractable Ground Water Resource**

S.N.	Name of District	Total Annual Extractable Resource of Assessed Units (in mcm)	Safe		Semi-Critical		Critical		Over-Exploited	
			Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%
1	Agar Malwa	404.03	108.3	26.81	104.57	25.88	-	-	191.16	47.31
2	Alirajpur	199.3	199.3	100	-	-	-	-	-	-
3	Anuppur	269.94	224.12	83.03	45.82	16.97	-	-	-	-
4	Ashoknagar	368.24	217.8	59.15	150.44	40.85	-	-	-	-
5	Balaghat	719.49	719.49	100	-	-	-	-	-	-
6	Barwani	520.36	356.7	68.55	102.51	19.7	-	-	61.16	11.75
7	Betul	977.5	722.52	73.91	254.99	26.09	-	-	-	-
8	Bhind	899.54	899.54	100	-	-	-	-	-	-
9	Bhopal	379.49	-	-	379.49	100	-	-	-	-
10	Burhanpur	339.63	165.32	48.68	174.31	51.32	-	-	-	-
11	Chhatarpur	809	434.9	53.76	374.1	46.24	-	-	-	-
12	Chhindwara	976.05	665.39	68.17	211.48	21.67	99.18	10.16	-	-
13	Damoh	365.76	308.65	84.39	57.11	15.61	-	-	-	-
14	Datia	401.22	401.22	100	-	-	-	-	-	-
15	Dewas	809.45	436.49	53.92	120.47	14.88	-	-	252.49	31.19
16	Dhar	1277.67	831.03	65.04	-	-	79.74	6.24	366.9	28.72
17	Dindori	332.58	332.58	100	-	-	-	-	-	-
18	Guna	773.15	773.15	100	-	-	-	-	-	-
19	Gwalior	757.74	708.4	93.49	49.34	6.51	-	-	-	-
20	Harda	439.48	439.48	100	-	-	-	-	-	-
21	Hoshangabad	1636.96	1453.86	88.81	183.1	11.19	-	-	-	-
22	Indore	534.36	-	-	106.83	19.99	59	11.04	368.53	68.97
23	Jabalpur	612.97	580.94	94.78	32.03	5.22	-	-	-	-

S.N.	Name of District	Total Annual Extractable Resource of Assessed Units (in mcm)	Safe		Semi-Critical		Critical		Over-Exploited	
			Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%
24	Jhabua	242.8	222.34	91.57	20.46	8.43	-	-	-	-
25	Katni	380.29	380.29	100	-	-	-	-	-	-
26	Khandwa	1051.96	933.15	88.71	118.81	11.29	-	-	-	-
27	Khargone	921.48	864.84	93.85	56.64	6.15	-	-	-	-
28	Mandla	467.72	467.72	100	-	-	-	-	-	-
29	Mandsaur	631.81	-	-	315.37	49.91	-	-	316.45	50.09
30	Morena	646.16	646.16	100	-	-	-	-	-	-
31	Narsinghpur	1127.62	916.14	81.25	211.48	18.75	-	-	-	-
32	Neemuch	361.49	-	-	113.02	31.26	-	-	248.47	68.74
33	Niwari	181.2	112.16	61.9	69.04	38.1	-	-	-	-
34	Panna	506.01	506.01	100	-	-	-	-	-	-
35	Raisen	868.14	776.26	89.42	91.88	10.58	-	-	-	-
36	Rajgarh	865.24	-	-	563.65	65.14	167.34	19.34	134.26	15.52
37	Ratlam	769.03	-	-	117.5	15.28	-	-	651.53	84.72
38	Rewa	498.21	461.18	92.57	37.03	7.43	-	-	-	-
39	Sagar	1023.71	1023.71	100	-	-	-	-	-	-
40	Satna	690.18	368.78	53.43	321.4	46.57	-	-	-	-
41	Sehore	674.95	543.1	80.47	-	-	131.84	19.53	-	-
42	Seoni	683.94	683.94	100	-	-	-	-	-	-
43	Shahdol	531.72	531.72	100	-	-	-	-	-	-
44	Shajapur	514.68	-	-	121.84	23.67	-	-	392.84	76.33
45	Sheopur	506.75	412.39	81.38	94.35	18.62	-	-	-	-
46	Shivpuri	783.2	322.2	41.14	461	58.86	-	-	-	-
47	Sidhi	292.12	292.12	100	-	-	-	-	-	-

S.N.	Name of District	Total Annual Extractable Resource of Assessed Units (in mcm)	Safe		Semi-Critical		Critical		Over-Exploited	
			Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%
48	Singrauli	354.57	354.57	100	-	-	-	-	-	-
49	Tikamgarh	364.29	-	-	364.29	100	-	-	-	-
50	Ujjain	913.73	-	-	473.26	51.79	-	-	440.47	48.21
51	Umariya	342.39	342.39	100	-	-	-	-	-	-
52	Vidisha	854.44	632.4	74.01	222.04	25.99	-	-	-	-
<b>Grand Total</b>		<b>32853.75</b>	<b>22772.77</b>	<b>69.32</b>	<b>6119.62</b>	<b>18.63</b>	<b>537.1</b>	<b>1.63</b>	<b>3424.26</b>	<b>10.42</b>

Table 4.6: Category wise Recharge worthy area

S.N.	Name of District	Total Recharge Worthy Area of Assessed Units (in sq.km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%
1	Agar Malwa	2515.76	654.46	26.01	700.83	27.86	-	-	1160.47	46.13	-	-
2	Alirajpur	3054	3054	100	-	-	-	-	-	-	-	-
3	Anuppur	2942	2602	88.44	340	11.56	-	-	-	-	-	-
4	Ashoknagar	4622.44	2462.59	53.27	2159.85	46.73	-	-	-	-	-	-
5	Balaghat	8917.93	8917.93	100	-	-	-	-	-	-	-	-
6	Barwani	3668.31	2646.15	72.14	730.36	19.91	-	-	291.8	7.95	-	-
7	Betul	8564.5	6663.5	77.8	1901	22.2	-	-	-	-	-	-
8	Bhind	4459	4459	100	-	-	-	-	-	-	-	-
9	Bhopal	2648	-	-	2648	100	-	-	-	-	-	-

S.N.	Name of District	Total Recharge Worthy Area of Assessed Units (in sq.km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%
10	Burhanpur	2570.5	1400.5	54.48	1170	45.52	-	-	-	-	-	-
11	Chhatarpur	7904.34	3938.28	49.82	3966.06	50.18	-	-	-	-	-	-
12	Chhindwara	8847.77	6631.89	74.96	1580.72	17.87	635.16	7.18	-	-	-	-
13	Damoh	4746.19	3842.82	80.97	903.37	19.03	-	-	-	-	-	-
14	Datia	2662	2662	100	-	-	-	-	-	-	-	-
15	Dewas	5770.82	3313.7	57.42	876.31	15.19	-	-	1580.81	27.39	-	-
16	Dhar	8126.4	5169	63.61	-	-	534	6.57	2423.4	29.82	-	-
17	Dindori	4560	4560	100	-	-	-	-	-	-	-	-
18	Guna	6175.14	6175.14	100	-	-	-	-	-	-	-	-
19	Gwalior	4283	3859.65	90.12	423.35	9.88	-	-	-	-	-	-
20	Harda	2700.9	2700.9	100	-	-	-	-	-	-	-	-
21	Hoshangabad	5583.52	4914.52	88.02	669	11.98	-	-	-	-	-	-
22	Indore	3818.97	-	-	1020.92	26.73	530	13.88	2268.05	59.39	-	-
23	Jabalpur	4438.68	4070.28	91.7	368.4	8.3	-	-	-	-	-	-
24	Jhabua	3112.53	2699.53	86.73	413	13.27	-	-	-	-	-	-
25	Katni	4666.48	4666.48	100	-	-	-	-	-	-	-	-
26	Khandwa	5814.46	4953.46	85.19	861	14.81	-	-	-	-	-	-
27	Khargone	6568.97	6074.57	92.47	494.4	7.53	-	-	-	-	-	-
28	Mandla	5739.9	5739.9	100	-	-	-	-	-	-	-	-
29	Mandsaur	4956.4	-	-	2438.83	49.21	-	-	2517.57	50.79	-	-
30	Morena	4384.89	4384.89	100	-	-	-	-	-	-	-	-
31	Narsinghpur	4791	3947	82.38	844	17.62	-	-	-	-	-	-
32	Neemuch	3757.44	-	-	1153	30.69	-	-	2604.44	69.31	-	-

S.N.	Name of District	Total Recharge Worthy Area of Assessed Units (in sq.km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%
33	Niwari	1525.62	939.62	61.59	586	38.41	-	-	-	-	-	-
34	Panna	6624.75	6624.75	100	-	-	-	-	-	-	-	-
35	Raisen	6609.4	5745	86.92	864.4	13.08	-	-	-	-	-	-
36	Rajgarh	6154.98	-	-	3881.98	63.07	1368	22.23	905	14.7	-	-
37	Ratlam	4616	-	-	973	21.08	-	-	3643	78.92	-	-
38	Rewa	5937.6	5490.3	92.47	447.3	7.53	-	-	-	-	-	-
39	Sagar	9254.18	9254.18	100	-	-	-	-	-	-	-	-
40	Satna	6721.06	3576.89	53.22	3144.17	46.78	-	-	-	-	-	-
41	Sehore	4639.72	3457.81	74.53	-	-	1181.91	25.47	-	-	-	-
42	Seoni	8050.2	8050.2	100	-	-	-	-	-	-	-	-
43	Shahdol	4978	4978	100	-	-	-	-	-	-	-	-
44	Shajapur	3406.17	-	-	883.07	25.93	-	-	2523.1	74.07	-	-
45	Sheopur	5334.8	3697.8	69.31	1637	30.69	-	-	-	-	-	-
46	Shivpuri	9770.49	4354.54	44.57	5415.95	55.43	-	-	-	-	-	-
47	Sidhi	3604.05	3604.05	100	-	-	-	-	-	-	-	-
48	Singrauli	4512.6	4512.6	100	-	-	-	-	-	-	-	-
49	Tikamgarh	3355.38	-	-	3355.38	100	-	-	-	-	-	-
50	Ujjain	5939.33	-	-	3302.11	55.6	-	-	2637.22	44.4	-	-
51	Umariya	4219	4219	100	-	-	-	-	-	-	-	-
52	Vidisha	6707.7	5056.7	75.39	1651	24.61	-	-	-	-	-	-
<b>Grand Total</b>		<b>269333.3</b>	<b>190725.6</b>	<b>70.81</b>	<b>51803.76</b>	<b>19.23</b>	<b>4249.07</b>	<b>1.58</b>	<b>22554.86</b>	<b>8.37</b>	<b>-</b>	<b>-</b>

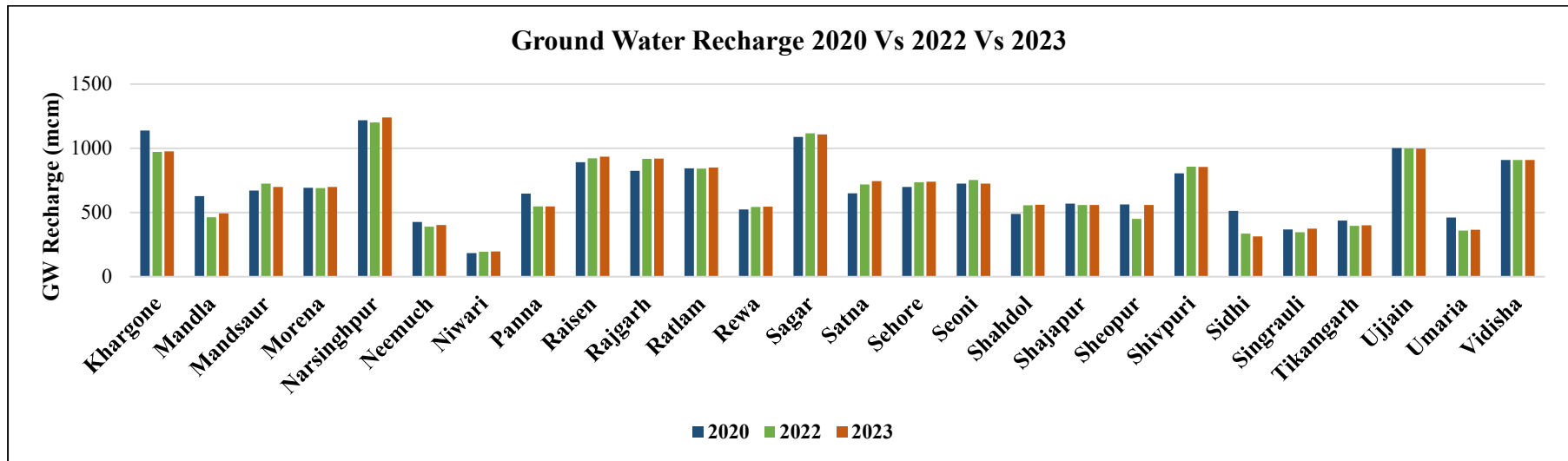
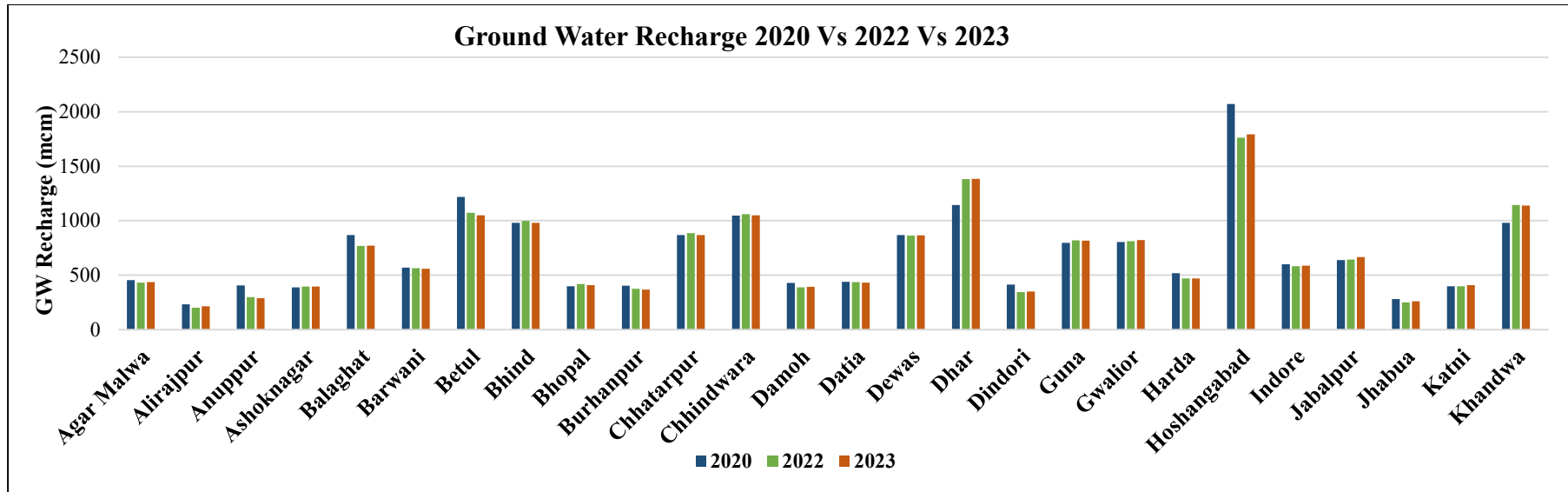


Fig.4.13: District wise Ground water Recharge Comparison

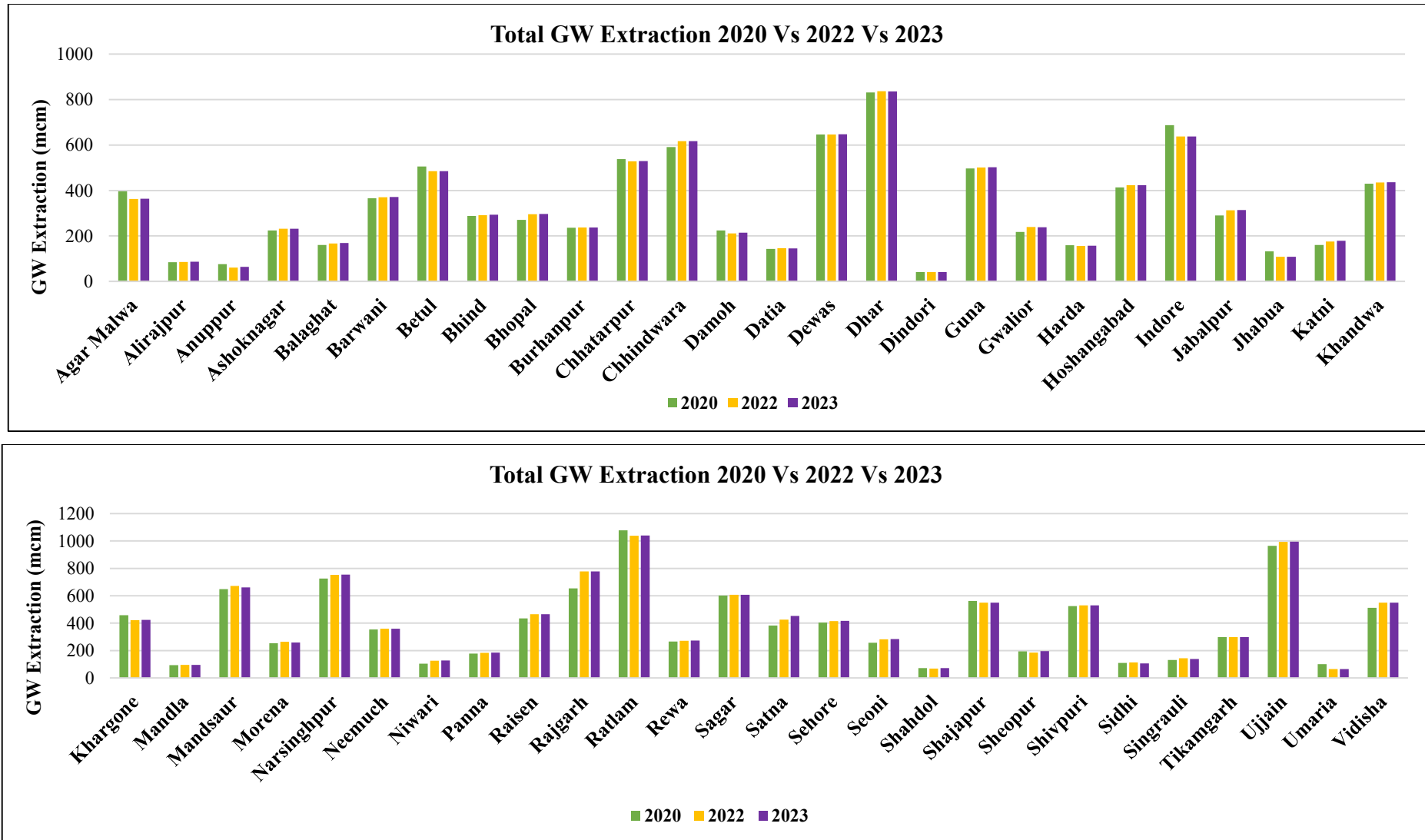


Fig.4.14: District wise Ground water Extraction Comparison

#### 4.9 COMPARISON OF RESOURCE OF 2022 WITH BASE YEAR 2023

The total ground water recharge in the state for the year 2022 was 3524443 ham (35.24), while in 2023 the ground water recharge is 3547408 ham (35.47). In general, the reasons for increase can be attributed to increased rainfall recharge and implementation of water conservation structures. The recharge from other sources in the state in 2022 was 825585 ham (8.26 bcm) while in 2023 the recharge due to other sources is 840018 ham (8.40 bcm). The district wise comparison of the recharge in 2020, 2022 and 2023 is given in the **Fig.4.13**. The annual extractable resource in the state computed in 2022 was 3257963 ham (32.58 bcm) while in 2023 it is 3285375 ham (32.85 bcm).

The total groundwater extraction in the state for the year 2022 was 1925334 ham (19.25 bcm), but in the year 2023 total groundwater extraction is increased to 1930027 ham (19.30 bcm) due to the revision of well census data, population. The district wise comparison of Ground Water extraction in 2020, 2022 and 2023 is given in the **Fig.4.14**.

The stage of ground water extraction has reached to 58.75% as compared to 59.10% in assessment year 2022. In the assessment year-2023 there is no change in categorization as compared to 2022, 233 assessment units falling in safe category, 60 assessment units falling in semi-critical category, 05 assessment units in Critical category and 26 units in over-exploited category which remains same as previous assessment year.

The ground water resources of the individual block /assessment unit show wide variation in the resource available and stage of ground water extraction.

The assessment units improved or deteriorated from 2017 to 2023 assessment are given in **Table 4.7**. For comparison of ground water resources data computed using GEC'2015 analysis of district wise figures is made for year 2022 and 2023, which is given in **Table 4.8**.

**Table 4.7: Comparison of Categorization of Improved and Deteriorated Assessment Units (2017 and 2022)**

S. N	District	Assessment Unit	Stage of Ground Water Extraction (%) in 2017	Categorization in 2017	Stage of Ground Water Extraction (%) in 2023	Categorization in 2022
<b>Improved</b>						
1	DAMOH	Batiyagarh	73.37	semi_critical	64.31	safe
2	MANDSAUR	Bhanpura	96.48	critical	87.74	semi_critical
3	MANDSAUR	Malhargarh	93.97	critical	83.58	semi_critical
4	RAISEN	Sanchi	73.15	semi_critical	60.98	safe
5	SAGAR	Banda	70.38	semi_critical	58.12	safe

S. N	District	Assessment Unit	Stage of Ground Water Extraction (%) in 2017	Categorization in 2017	Stage of Ground Water Extraction (%) in 2023	Categorization in 2022
<b>Deteriorated</b>						
1	ANUPPUR	Kotma	7.31	safe	79.05	semi_critical
2	ASHOKNAGAR	Chanderi	56.78	safe	71.14	semi_critical
3	ASHOKNAGAR	Isagarh	67.06	safe	78.93	semi_critical
4	BHOPAL	Berasia	68.93	safe	75.41	semi_critical
5	BURHANPUR	Burhanpur	67.48	safe	73.81	semi_critical
6	CHHATARPUR	Bijawar	66.91	safe	71.22	semi_critical
7	CHHINDWARA	Chhindwara	88.5	semi_critical	99.43	critical
8	CHHINDWARA	Mohkheda	67.73	safe	75.59	semi_critical
9	DHAR	Tirla	87.6	semi_critical	95.62	critical
10	HOSHANGABAD	Bankhedi	68.56	safe	81.37	semi_critical
11	JHABUA	Jhabua	67.74	safe	83.27	semi_critical
12	NARSINGHPUR	Narsinghpur	67.48	safe	77.09	semi_critical
13	NEEMUCH	Jawad	96.1	critical	109.45	over_exploited
14	NEEMUCH	Neemuch	94.64	critical	107.22	over_exploited
15	RAJGARH	Rajgarh	67.88	safe	72.95	semi_critical
16	RAJGARH	Sarangpur	95.39	critical	110.63	over_exploited
17	REWA	Mauganj	65.62	safe	74.94	semi_critical
18	SATNA	Amarpatan	65.79	safe	74.85	semi_critical
19	SEHORE	Ashta	77.36	semi_critical	99.66	critical
20	SHAJAPUR	Kalapipal	97.33	critical	110.83	over_exploited
21	SHEOPUR	Vijaypur	63.7	safe	71.81	semi_critical
22	SHIVPURI	Kolaras	69.56	safe	74.05	semi_critical
23	VIDISHA	Gyaraspur	67.58	safe	70.27	semi_critical
24	VIDISHA	Kurwai	69.26	safe	75.8	semi_critical

**Table 4.8: District -wise comparison of resource between 2022 and 2023**

S. N.	District	Annual Extractable Groundwater Resource (ham)		Total Ground Water Extraction (ham)		Stage of Ground Water Extraction (%)	
		2022	2023	2022	2023	2022	2023
1	Agar Malwa	40085.67	40403.21	36310.9	36336.96	90.58	89.94
2	Alirajpur	18582.81	19930.2	8602.79	8633.15	46.29	43.32
3	Anuppur	28004.54	26993.74	6053.9	6349.33	21.62	23.52
4	Ashoknagar	36404.61	36824.34	23181.16	23207.03	63.68	63.02
5	Balaghat	70785.92	71949.04	16704.73	16909.36	23.6	23.5
6	Barwani	52314.59	52036.18	37065.94	37143.14	70.85	71.38
7	Betul	99244.6	97750.31	48475.3	48528.3	48.84	49.65
8	Bhind	91294.34	89953.59	29172.84	29373.62	31.95	32.65
9	Bhopal	38862.01	37948.75	29606.96	29712.91	76.18	78.3

S. N.	District	Annual Extractable Groundwater Resource (ham)		Total Ground Water Extraction (ham)		Stage of Ground Water Extraction (%)	
		2022	2023	2022	2023	2022	2023
10	Burhanpur	34605.71	33962.85	23674.78	23704.63	68.41	69.8
11	Chhatarpur	81465.66	80899.76	52872.8	52923.58	64.9	65.42
12	Chhindwara	99073.78	97605.19	61665.69	61722.98	62.24	63.24
13	Damoh	36077.15	36576.17	21156.64	21388.93	58.64	58.48
14	Datia	40304.29	40122.32	14577.93	14464.77	36.17	36.05
15	Dewas	80704.84	80944.58	64681.73	64753.63	80.15	80
16	Dhar	128641.78	127766.67	83662.84	83557.97	65.04	65.4
17	Dindori	32606.26	33257.8	4133.23	4164.57	12.68	12.52
18	Guna	76657.21	77314.59	50175.9	50219.89	65.45	64.96
19	Gwalior	74870.84	75773.72	23895.85	23807.29	31.92	31.42
20	Harda	42912.68	43947.6	15644.99	15665.19	36.46	35.65
21	Hoshangabad	161615.74	163696.36	42298.05	42335.23	26.17	25.86
22	Indore	52999.95	53436.36	63753.84	63792.93	120.29	119.38
23	Jabalpur	59726.79	61296.83	31244.65	31449.17	52.31	51.31
24	Jhabua	23348.92	24280.48	10813.8	10876.28	46.31	44.79
25	Katni	37236.74	38029.19	17536.65	17917.68	47.1	47.12
26	Khandwa	105370.85	105196.25	43572.82	43636.4	41.35	41.48
27	Khargone	92099.37	92147.84	42136.5	42322.26	45.75	45.93
28	Mandla	43590.69	46772.43	9509.63	9546.28	21.82	20.41
29	Mandsaur	65121.79	63181.48	67169.93	66067.55	103.15	104.57
30	Morena	63196.22	64615.54	26435.82	25930.52	41.83	40.13
31	Narsinghpur	110803.62	112762.33	75267.39	75495.2	67.93	66.95
32	Neemuch	35098.35	36148.63	35851.23	35871.88	102.15	99.23
33	Niwari	18001.02	18120.11	12625.12	12656.29	70.14	69.85
34	Panna	49601.45	50601.49	18308.74	18459.75	36.91	36.48
35	Raisen	85150.61	86813.92	46514.82	46593.92	54.63	53.67
36	Rajgarh	87119.98	86524.22	77817.23	77683.72	89.32	89.78
37	Ratlam	76080.83	76902.67	103784.5	103925.8	136.41	135.14
38	Rewa	49486.3	49820.96	27149.99	27226.55	54.86	54.65
39	Sagar	103184.22	102371.34	60641.65	60695.66	58.77	59.29
40	Satna	66512.51	69018.27	42559.47	45269.69	63.99	65.59
41	Sehore	67184.76	67494.59	41496.74	41699.87	61.77	61.78
42	Seoni	69625.5	68393.52	28246.69	28298.24	40.57	41.38
43	Shahdol	52389.57	53172.26	6884.07	7105.33	13.14	13.36
44	Shajapur	51495.34	51468.21	54991.68	55019.46	106.79	106.9
45	Sheopur	41351.53	50674.57	18572.93	19493.95	44.91	38.47
46	Shivpuri	78475.3	78319.96	52914.4	53000.39	67.43	67.67
47	Sidhi	30912.09	29212.27	11213.69	10549.05	36.28	36.11
48	Singrauli	32849.38	35457.15	14295.48	13856.77	43.52	39.08
49	Tikamgarh	36123.38	36428.83	29718.71	29808.19	82.27	81.83
50	Ujjain	91601.55	91373.06	99361.77	99439.27	108.47	108.83

S. N.	District	Annual Extractable Groundwater Resource (ham)		Total Ground Water Extraction (ham)		Stage of Ground Water Extraction (%)	
		2022	2023	2022	2023	2022	2023
51	Umariya	32238.77	34239.35	6376.02	6406.36	19.78	18.71
52	Vidisha	84870.33	85443.85	54952.98	55029.63	64.75	64.4
<b>TOTAL (ham)</b>		<b>3257963</b>	<b>3285375</b>	<b>1925334</b>	<b>1930027</b>	<b>59.1</b>	<b>58.75</b>
<b>TOTAL (bcm)</b>		<b>32.58</b>	<b>32.85</b>	<b>19.25</b>	<b>19.3</b>	<b>59.1</b>	<b>58.75</b>

## **CHAPTER-5**

### **5.0 DISTRICT WISE GROUND WATER RESOURCE**

The ground water conditions, its availability and utilization scenario and categorization of assessment units in different states are discussed in the previous chapter. District wise summaries are given below.

#### **5.1 AGAR**

Agar district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 272193 ha of geographical area, 251576 ha (92%) is ground water recharge worthy area and 20617 ha (8%) is hilly area. There are four number of assessment units (block) in the district out of which Barod block falls under Semi-Critical category and Nalkhera and Susner fall in over exploited category. The highest stage of ground water development is computed as 124.44 % in Nalkhera block. The annual extractable groundwater resource in the district is 40403 ham and net ground water extraction for all uses is 36336 ham, making stage of ground water Extraction 89.93% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 6514 ham.

#### **5.2 ALIRAJPUR**

Alirajpur district is underlain by Archaean Granite-gneisses, phyllite Basaltic lava flows of Deccan trap and Bagh Bed. Dynamic Ground water resources of the district have been estimated for base year- 2023, on block wise basis. Out of 331800 ha of geographical area, 305400 ha (92%) is ground water recharge worthy area and 26400 ha (8%) is hilly area. There are six number of assessment units (block) in the district which fall under non-command category, there are no major irrigation projects in the district, and medium irrigation project for irrigation. All blocks of the district are categorized as safe blocks, and highest stage of ground water extraction is computed as 69.01 % for Bhabra Block. The annual extractable groundwater resource in the district is 19930 ham and total ground water extraction for all uses is 6722 ham, making stage of ground water Extraction 43.31% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 11158 ham.

#### **5.3 ANUPPUR**

Anuppur district is underlain by Archaean Granite-gneisses, Gondwanas sandstone-clays, Lametas and Deccan trap basalts. Dynamic ground water resources of Anuppur district have been estimated for base year – 2023, on block- wise basis. Out of 372400 ha of geographical

area, 294200 ha (79%) is ground water recharge worthy area and 78200 ha (21%) is hilly area. There are four number of assessment units (block) in the district which fall under non-command sub-unit, as there are no major and medium irrigation projects in the district. Highest stage of ground water Extarction is computed as 79.05% for Kotma Block. The annual extractable groundwater resource in the district is 26993 ham and ground water extraction for all uses is 1483 ham, making stage of ground water extraction 23.52% as a whole for district. After making allocation for future domestic for year 2025, balance available ground water for future use would be 20583 ham.

#### **5.4 ASHOKNAGAR**

Ashoknagar district is underlain by Deccan trap basalts, Vindhyan sandstone and Archaean granite-gneisses. Dynamic Ground water resources of the district have been estimated for base year -2023, on block- wise basis. Out of 467394 ha of geographical area, 462244 (98%) ha is ground water recharge worthy area and 5150 (2%) is hilly area. There are four numbers of assessment units (block) in the district having command area (4.46 %) and non-command area (95.54%). Out of four blocks of the district, two blocks are categorized as safe and two blocks are as semi-critical. Highest stage of ground water extraction is computed as 78.93 % in Ishagarh block. The annual extractable resource in the district is 36405 ham and gross ground water extraction for all uses is 23181 ham, making stage of ground water extraction 63.02% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 1928 ham.

#### **5.5 BALAGHAT**

Balaghat district is underlain by Archaean Granite, gneisses and phyllites. Dynamic Ground water resources of the district have been estimated for base year -2023, on block wise basis. Out of 922900 ha of geographical area, 891793 ha (97 %) is ground water recharge worthy area and 31107 ha (3%) is hilly area. There are ten numbers of assessment units (block) in the district which fall under command (11%) and non-command (89%) sub units. All blocks of the district are categorized as safe blocks, and highest stage of ground water extraction is computed as 56.13% for Katangi Block. The annual extractable ground water resource in the district is 71949 ham and ground water extraction for all uses is 12657 ham, making stage of ground water extraction 23.50% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 54872 ham.

#### **5.6 BARWANI**

Barwani district is underlain by, Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year-2023, on block-wise basis. Out of

542200 ha of geographical area, 366831 (68%) ha is ground water recharge worthy area and 175369 ha (32%) is hilly area. There are seven number of assessment units (block) in the district which fall under command and non-command sub-unit. Barwani, Niwali, Pati, Thikari and Sendhwa blocks of the district are categorized as safe blocks, Rajpur as semi critical, and Pansema as over exploited with highest stage of ground water extraction which is computed as 138.33%. The annual extractable ground water resource in the district is 52036 ham and ground water extraction for all uses is 33377 ham, making stage of ground water extraction 71.37% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 19039 ham.

### **5.7 BETUL**

Betul district is underlain by Archaeans Granite-gneisses, Gondwanas sandstone-clays, Lametas and Deccan trap basalts. Dynamic ground water resources of the district have been estimated for base year - 2023, on block-wise basis. Out of 1004300 ha of geographical area, 856450 ha (85%) is ground water recharge worthy area and 147850 ha (15%) is hilly area. There are ten numbers of assessment units (block) in the district which fall under command (3.41 %) and non-command (96.59%) sub units. All blocks of the district are categorized as safe blocks except Betul and Multai block. Multai block having highest stage of ground water extraction, which is computed as 82.75%, and Betul having 81.47% as Semi-Critical Category. The annual extractable ground water resource in the district is 97750 ham and ground water extraction for all uses is 44632 ham, making stage of ground water extraction 49.64% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 49031 ham.

### **5.8 BHIND**

Bhind district is characterized by alluvial formation, Vindhyan Formation, and Gwalior Series. Dynamic Ground water resources of the district have been estimated for base year -2023, on block-wise basis. Out of 445900 ha of geographical area, 445900 ha (100%) is ground water recharge worthy area. There are six numbers of assessment units (block) in the district which fall under command (40%) and non-command (60%) sub units. All blocks of the district are categorized as safe blocks, and highest stage of ground water extraction is computed as 36.55% for Lahar Block. The annual extractable ground water resource in the district 89954 ham and ground water extraction for all uses is 25662 ham, making stage of ground water extraction 32.65% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 60384 ham.

## **5.9 BHOPAL**

Bhopal district is underlain by Deccan trap basalts and Vindhyan sandstone. Dynamic ground water resources of the district have been estimated for base year -2023, on block wise basis. Out of 277237 ha of geographical area, 264800 ha (96%) is ground water recharge worthy area and 12437 ha (4%) is hilly area. There are three number of assessment units (two blocks and one urban area) in the district which fall under non-command sub unit. All assessment units of the district are categorized as Semi- Critical. Highest stage of ground water extraction is computed as 83.45 for Phanda. The annual extractable ground water resource in the district is 37948 ham and ground water extraction for all uses is 23916 ham, making stage of Ground water extraction 78.29 as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 7761 ham.

## **5.10 BURHANPUR**

Burhanpur district is underlain by, Basaltic lava flows of Deccan trap and Tapi alluvium. Dynamic Ground water resources of the district have been estimated for base year -2023, on block-wise basis. Out of 323300 ha of geographical area, 257050 ha (80%) is ground water recharge worthy area and 66250 ha (20%) is hilly area. There are two number of assessment units (block) in the district which fall under command (4%) and non-command (96%) sub units. Burhanpur block is categorized as Semi-critical while Khakner is categorized as safe with highest stage of ground water extraction is computed as 73.81% for Burhanpur block. The annual extractable ground water resource in the district is 33962 ham and ground water extraction for all uses is 41940 ham, making stage of ground water extraction 69.75 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 10127 ham.

## **5.11 CHHATARPUR**

About 65% of the district is occupied by Bundelkhand granite in northern & north central part with a thin soil cover. The exposure of Bijawars triangular in shape and constitute about 15% of the south eastern part of the district. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 868736 ha of geographical area, 790434 ha (92%) is ground water recharge worthy area and 78302 ha (8%) is hilly area. There are eight number of assessment units (block) in the district which fall under non-command (86%) and command (14%) sub units. Badamalhara, Gaurihar, Loundi and Rajnagar blocks are in safe. Buxwaha, Chhatarpur, Nowgaon and Bijawar are under semi critical. Highest stage of ground water extraction is computed as 80.99 % for Nowgaon Block. Annual extractable ground water resource in the district 80899 ham and ground water extraction for all uses is

49738 ham, making stage of ground water extraction 65.42% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 27798 ham.

### **5.12 CHHINDWARA**

Chhindwara district is underlain by Deccan trap basalts, Archaean granite-gneisses and Gondwanas sandstone-clays. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 1181500 ha of geographical area, 884777 ha (75%) is ground water recharge worthy area and 296723 ha (25%) is hilly area. There are eleven number of assessment units (block) in the district which fall under non-command (99 %) and command (1 % Morkhed and Sausar) sub units. Amarwara, Bichhua, Chourai, Harrai, Jamai, Sausar, Parasia and Tamia blocks of the district are categorized as safe blocks, Mohkhed, Pandurna are as semi critical, Chhindwada is categorized as critical. Highest stage of ground water extraction is computed as 99.43% for Chhindwara block. The annual extractable ground water resource in the district is 97605 ham and ground water extraction for all uses is 55742 ham, making stage of ground water extraction 63.23% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 35665 ham.

### **5.13 DAMOH**

Damoh district is underlain mainly by Vindhyan Shale, Limestone and Sandstone. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 730600 ha of geographical area, 474619 ha (65%) is ground water recharge worthy area and 255981 ha (35%) is hilly area. There are seven number of assessment units (block) in the district which fall under non-command (88 %) and command (12% ) sub units. Damoh, Hatta, Jabeera, Patera, Tedukheda, blocks of the district are categorized as safe blocks, and Pathariya as semi critical. The highest stage of ground water extraction is computed as 80.47% in Pathariya block. The annual extractable ground water resource in the district is 36576 ham and ground water extraction for all uses is 18757 ham, making stage of ground water extraction 58.47% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 14783 ham.

### **5.14 DATIA**

Datia district is characterized by alluvial formation, Bundelkhand Granite gneiss, and Gwalior Series Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 269100 ha of geographical area, 266200 ha (99%) is ground water recharge worthy area and 2900 (1%) is hilly area. There are three numbers of assessment units

(block) in the district which fall under command (49%) and non-command (51%) sub units. All blocks of the district are categorized as safe blocks with highest stage of ground water development of 53.26% in Datia block. The annual extractable ground water resource in the district 40122 ham and ground water extraction for all uses is 12664 ham, making stage of ground water extraction 36.05% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 25529 ham.

### **5.15 DEWAS**

Dewas district is underlain by Deccan trap basalts, Archaeans granite-gneisses and Vindhyan sandstone. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out 702084 ha of geographical area, 577082 ha (79 %) is ground water recharge worthy area and 125002 ha (21%) is hilly area. There are six number of assessment units (block) in the district which fall under non-command (97 %) and command (3% Bagli and Kannod) sub units. Bagli, Kannod and Tonkkhurd blocks of the district are categorized as safe blocks. Kategaon block of the district is categorized as semi critical block, Dewas and Sonkatch blocks as over exploited with highest stage of ground water extraction of 110.88% in Dewas block. The annual extractable ground water resource in the district is 80944 ham and ground water extraction for all uses is 60357 ham, making stage of ground water extraction 79.99% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 18015 ham.

### **5.16 DHAR**

Dhar district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 815300 ha of geographical area, 812640 ha (almost 100%) is ground water recharge worthy area and 2660 ha (less than 1%) is hilly area. There are thirteen number of assessment units (block) in the district which fall under non-command (82 %) and command (18 %) sub units. Bagh, Dahi, Dharamपुरi, Gandhwani, Kukshi, Manawar, Nisarpur, Sardarpur and Umraban blocks of the district are categorized as safe blocks. Tirla are categorized as critical and Badnawar, Dhar and Nalchha are categorized as over exploited with highest stage of ground water development is computed as 153.44% Dhar block. Annual extractable ground water resource in the district is 127766 ham and ground water extraction for all uses is 76853 ham, making stage of ground water extraction 65.39% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 55147 ham.

### **5.17 DINDORI**

Dindori district is underlain by Deccan trap basalts. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 572500 ha of geographical area, 456000 ha (81%) is ground water recharge worthy area and 116500 ha (19%) is hilly area. There are seven number of assessment units (block) in the district which fall under non-command sub units. All blocks of the district are categorized as safe blocks, and highest stage of ground water extraction is computed as 16.97% for Shahpura Block. The annual extractable ground water resource in the district is 33257 ham and Ground Water extraction for all uses is 2316 ham, making stage of ground water extraction 12.52 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 28955 ham.

### **5.18 GUNA**

Guna district is underlain by Deccan trap basalts, Vindhyan sandstone and laterites. Dynamic ground water resources of the district have been estimated for base year-2023 on block-wise basis. Out of 639000 ha of geographical area, 617514 ha (97%) is ground water recharge worthy area and 21486 ha (3%) is hilly area. There are five number of assessment units in the district which fall under non-command (94%) and command (6%) units. Presently all the blocks of the district are categorized as safe blocks. The highest stage of ground water development is computed as 69.63% in Chachaura block. The annual extractable ground water resource in the district is 77314 ham and ground water extraction for all uses is 47608 ham, making stage of ground water extraction 64.95% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 26911 ham.

### **5.19 GWALIOR**

Gwalior district is characterized by Gwalior Series, Bundelkhand granite gneiss, Vindhyan sandstone and alluvial formations. Dynamic ground water resources of the district have been estimated for base year – 2023 on block-wise basis. Out of 456400 ha of geographical area, 428300 ha (94%) is ground water recharge worthy area and 28100 ha (6%) is hilly area. In the district there are total five number of assessment units (four blocks and one urban area), out of which three numbers of assessment units (Bhitarwar, Dabra and Ghatigaon) in the district fall under command (30%) and all five assessment units (Bhitarwar, Dabra, Ghatigaon and Morar) fall under non-command (70%) sub units. All assessment units of the district are categorized as safe blocks except the Gwalior\_Urban area which comes under semi critical category with highest stage of ground water extraction of 76.92%. The annual extractable ground water

resource in the district is 75774 ham and ground water extraction for all uses is 18052 ham, making stage of ground water extraction 31.41% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 51447 ham.

### **5.20 HARDA**

Harda district is characterized by alluvial formations and Deccan trap basaltic lava flow. Dynamic ground water resources of the district have been estimated for base year – 2023 on block-wise basis. Out of 333000 ha of geographical area, 270090 ha (81%) is ground water recharge worthy area and 62910 ha (19%) is hilly area. There are three numbers of assessment units in the district which fall under command (29%) and non-command (71%) categories sub units. All blocks of the district are categorized as safe blocks, with highest stage of ground water development of 67.89% in Khirkiya block. The annual extractable ground water resource in the district 43947 ham and ground water extraction for all uses is 14405 ham, making Stage of Ground water extraction 35.64% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 28195 ham.

### **5.21 HOSHANGABAD**

Hoshangabad district is characterized by alluvial formations, Gondwana, Archaean and Deccan trap basaltic lava flow. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 670400 ha of geographical area, 558352 ha (83%) is ground water recharge worthy area and 112048 ha (17%) is hilly area. There are seven number of assessment units in the district which fall under command (45%) and non-command (55%) sub units. All blocks of the district are categorized as safe blocks, except Bankhedi, which is categorized as semi-critical with the highest stage of ground water extraction of 81.37%. The annual extractable ground water resource in the district 163696 ham and ground water extraction for all uses is 40065 ham, making stage of ground water extraction 25.86% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 121265 ham.

### **5.22 INDORE**

Indore district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 389800 ha of geographical area, 381897 ha (98%) is ground water recharge worthy area and 7,903 ha (2%) is hilly area. There are five number of assessment units (Depalpur, Indore,

Mhow, Sanwer and Indore\_Urban) in the district which fall under non-command (99 %) and command (1% Mhow and Depalpur) sub units. Mhow block of the district is categorized as semi critical and Depalpur, Indore, Sanwer and the Indore\_Urban also categorized as over exploited. The highest stage of ground water extraction is computed as 142.82% in Depalpur block. The annual extractable ground water resource in the district is 54436 ham and ground water extraction for all uses is 54421 ham, making stage of ground water extraction 119.38 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 2547 ham.

### **5.23 JABALPUR**

Jabalpur district is underlain by Alluvium, Archaean granite, Basaltic lava flows of Deccan trap Bijawar and Vindhyan sandstone. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 522093 ha of geographical area, 443868 ha (83%) is ground water recharge worthy area and 78225 ha (17%) is hilly area. There are eight number of assessment units (seven blocks and one urban area) in the district which fall under non-command (82%- Kundam and Majholi) and command (18%) sub units. All the assessment units are categorized as safe except the Jabalpur\_Urban area it is in semi-critical category. The highest stage of ground water extraction is computed as 89% Jabalpur\_Urban. The annual extractable ground water resource in the district is 61296 ham and ground water extraction for all uses is 25295 ham, making stage of ground water extraction 51.31% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 29704 ham.

### **5.24 JHABUA**

Jhabua district is underlain by Archaeans granite-gneisses, phyllite and Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 346000 ha of geographical area, 311253 ha (90%) is ground water recharge worthy area and 34747 ha (10%) is hilly area. There are six number of assessment units (block) in the district which fall under non-command (95%) and command (5%) (Petlawad) categories. All blocks of the district are categorized as safe blocks, except Jhabua, which is categorized as semi critical and highest stage of ground water extraction is computed as 83.27% for Jhabua Block. The annual extractable ground water resource in the district is 24280 ham and ground water extraction for all uses is 8065 ham, making stage of ground water extraction 44.79% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 13066 ham.

### **5.25 KATNI**

Katni district is underlain by Vindhyan sandstone, Bijawar Alluvium and Basaltic lava flows of Deccan trap and. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 489400 ha of geographical area, 466648 ha (95 %) is ground water recharge worthy area and 22752 ha (5%) is hilly area. There are six number of assessment units (block) in the district which fall under non-command (93 %) and command (7 %) sub units. All the blocks of the district are categorized as safe. Highest stage of ground water extractoion is computed as 62.40% for Vijayraghogarh. The annual extractable ground water resource in the district is 38029 ham and ground Water extraction for all uses is 14014 ham, making stage of ground water extraction 47.12% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 19902 ham.

### **5.26 KHANDWA**

Khandwa district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year – 2023 on block-wise basis. Out of 752450 ha of geographical area, 581446 ha (77%) is ground water recharge worthy area and 171004 ha (23%) is hilly area. There are seven number of assessment units (block) in the district which fall under non-command (85%) and command (15%, Chhegaon Makhan, Khandwa, Punasa and Pandhana) sub units. All the blocks except, Chhegaon Makhan are categorized as safe. Chhegaon Makhan block of the district is categorized as semi critical. The highest stage of ground water extraction is computed as 86.48% in Chhegaon Makhan. The annual extractable ground water resource in the district is 105196 ham and ground water extraction for all uses is 40541 ham, making Stage of Ground water extraction 41.48 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 61341 ham.

### **5.27 KHARGONE**

Khargone district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year – 2023 on block-wise basis. Out of 803000 ha of geographical area, 656897 ha (82 %) is ground water recharge worthy area and 146103 ha (18 %) is hilly area. There are nine number of assessment units (block) in the district which fall under non-command (74%) and command (26%) sub units. All the blocks are categorized as safe except Khargone. Khargone block of the district are categorized as semi-critical. The highest stage of ground water extraction is computed as 77.77 % in Khargone. The annual extractable ground water resource in the district is 92147 ham and ground water

extraction for all uses is 37725 ham, making stage of ground water extraction 45.92% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 49477 ham.

### **5.28 MANDLA**

Mandla district is underlain by Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 754400 ha of geographical area, 573990 ha (83%) is ground water recharge worthy area and 180410 ha (17%) is hilly area. There are nine number of assessment units (block) in the district which fall under non-command (95 %) and command (5 %- Bichhiya, Mandla and Nainpur) sub units. All blocks of the district are categorized as safe blocks, and highest stage of ground water extraction is computed as 51.98% for Mohgaon Block. The annual extractable ground water resource in the district is 46772 ham and ground water extraction for all uses is 7008 ham, making Stage of Ground water extraction 20.41 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 37073 ham.

### **5.29 MANDSAUR**

Mandsaur district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 522938 ha of geographical area, 498468 ha (90%) is ground water recharge worthy area and 54470 ha (10 %) is hilly area. Garoth, Bhanpur and Malhargarh blocks of the district are categorized as semi critical, Mandsaur and Sitamua as over exploited. The highest stage of ground water extraction is computed as 130.97% Sitamau block. The annual extractable ground water resource in the district is 63181 ham and ground water extraction for all uses is 62918 ham, making stage of ground water extraction 104.56% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 6601 ham.

### **5.30 MORENA**

Morena district is characterized by alluvial formation, Vindhyan Formation and Gwalior Series. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 496889 ha of geographical area, 438489 ha (88 %) is ground water recharge worthy area and 58400 ha (12%) is hilly area. There are seven numbers of assessment units (block) in the district which fall under command (51 %) and non-command (49 %) sub units. All the seven blocks- ambah, Jaura, Kailaras, Morena, Pahadgarh, Porsa and Sabalgarh blocks are safe. The highest stage of ground water extraction is computed as 59.33% in Ambah

block. The annual extractable ground water resource in the district 64615 ham and ground water extraction for all uses is 19963 ham, making stage of ground water extraction 40.13% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 38217 ham.

### **5.31 NARSINGHPUR**

Narsinghpur district is underlain by Alluvium, Gondwana sandstone, Bijawar and Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year – 2023 on block-wise basis. Out of 513300 ha of geographical area, 479100 ha (89%) is ground water recharge worthy area and 34200 ha (11%) is hilly area. There are six number of assessment units (block) in the district which fall under non-command (90%) and command (10%) sub units. Except Narsinghpur block, which is categorized as semi critical, all other blocks are categorized as Safe. The highest stage of ground water extraction is computed 77.09 % in Narsinghpur block. The annual extractable ground water resource in the district is 112762 ham and Ground Water extraction for all uses is 72947 ham, making stage of ground water extraction 66.95% as a whole for district. After making allocation for future domestic for year 2025, balance available ground water for future use would be 37161 ham.

### **5.32 NEEMUCH**

Neemuch district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year – 2023 on block-wise basis. Out of 420044 ha of geographical area, 375744 ha (89%) is ground water recharge worthy area and 44300 ha (11 %) is hilly area. There are three number of assessment units (block) in the district which fall under non-command. Jawad and Neemuch blocks of the district are categorized as over exploited and Manasa as semi critical. The highest stage of ground water extraction is computed as 109.45% in Jawad block. The annual extractable ground water resource in the district is 36148 ham and ground water extraction for all uses is 34072 ham, making stage of ground water extraction 99.23 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 2846 ham.

### **5.33 NIWARI**

Niwari district is occupied by Bundelkhand granite with a thin soil cover. Dynamic ground water resources of the district have been estimated for base year- 2023 on block-wise basis. Out of 156462 ha of geographical area 152562 ha (97%) is ground water recharge worthy area and 3900 ha (3%) is hilly area. There are two number of assessment units (blocks) in the district which fall under non-command (89%) and command (11%) sub units. Niwari block is

categorized as Semi-Critical and Prithvipur as safe. Highest stage of ground water extraction is computed as 70.17% for Niwari block. The annual extractable ground water availability in the district 18120 ham and ground water extraction for all uses is 11520 ham, making stage of ground water extraction 69.84% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 5254 ham.

### **5.34 PANNA**

Panna district is underlain by Vindhyan Shale, Limestone and Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 713500 ha of geographical area, 662475 ha (93%) is ground water recharge worthy area and 51025 ha (7%) is hilly area. There are five number of assessment units (block) in the district which fall under non-command (95%) and command (5% Panna) sub units. All the blocks of the district are categorized as safe blocks. The highest stage of ground water extraction is computed as 41.31% in Gunnor block. The annual extractable ground water resource in the district 50601 ham and ground water extraction for all uses is 15770 ham, making stage of ground water extraction 36.48% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 31983 ham.

### **5.35 RAISEN**

Raisen district is underlain by Basaltic lava flows of Deccan trap Vindhyan Sandstone and Alluvium. Dynamic Ground water resource estimation of the district has been computed for Base Year-2023, on block wise basis. Out of 846640 ha of geographical area, 660940 (78%) ha is ground water recharge worthy area and 185700 (22 %) is hilly area. There are seven number of assessment units (block) in the district which fall under non-command (92%) and command (8% Badi) sub units. All blocks of the district are categorized as safe except Obedullaganj which fall in semi critical category. The highest stage of ground water extraction is computed as 89.04% Obedullaganj block. The annual extractable ground water resource in the district 86813 ham and ground water extraction for all uses is 42627 ham, making stage of ground water extraction 53.67% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 39910 ham.

### **5.36 RAJGARH**

Rajgarh district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year 2023 on block-wise basis. Out

of 6,15,498 ha of geographical area, 6,15,498 ha (100 %) is ground water recharge worthy area. There are six number of assessment units (block) in the district which fall under non-command. Biora, Khilchipur, Rajgarh and Zeerapur blocks of the district are categorized as semi critical, Narsingharh block of the district is categorized as critical, Sarangpur categorized as Over-Exploited. The highest stage of ground water extraction is computed as 110.63 % in Sarangpur block. The annual extractable ground water resource in the district is 46524 ham and ground water extraction for all uses is 73551 ham, making stage of ground water extraction 89.78 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 9937 ham.

### **5.37 RATLAM**

Ratlam district is underlain by Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 486100 ha of geographical area, 461600 ha (95 %) is ground water recharge worthy area and 24500 ha (5 %) is hilly area. There are seven number of assessment units (block) in the district which fall under non-command (98 %) and command (2% Bajna block) sub units. Alote, Jaora, Piploda and Ratlam blocks of the district are categorized as over exploited, Sailana and Bajna as semi critical. The highest stage of ground water extraction is computed as 170.51% in Jaora block. The annual extractable ground water resource in the district 76902 ham and ground water extraction for all uses is 99438 ham, making stage of ground water extraction 135.13% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 2377 ham.

### **5.38 REWA**

Rewa district is underlain by Vindhyan Shale, Limestone and Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 631360 ha of geographical area, 593760 ha (93%) is ground water recharge worthy area and 37600 ha (7%) hilly area. All blocks, of the district are categorized as safe, except Mauganj which is categorized as semi critical. The highest stage of ground water extraction is computed as 74.94% in Mauganj block. The annual extractable ground water resource in the district is 49820 ham and ground water extraction for all uses is 21372 ham, making stage of ground water extraction 54.64% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 22077 ham.

### **5.39 SAGAR**

Sagar district is underlain by Basaltic lava flows of Deccan trap Vindhyan Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 1025200 ha of geographical area, 925418 ha (90 %) is ground water recharge worthy area and 99782 ha (10 %) is hilly area. There are eleven number of assessment units (block) in the district which fall under non-command (95 %) and command (5 %) sub units. All the blocks are categorized as safe. The highest stage of ground water extraction is computed as 66.05% in Bina block. The annual extractable ground water resource in the district 102371 ham and ground water extraction for all uses is 56806 ham, making stage of ground water extraction 59.28% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 41393 ham.

### **5.40 SATNA**

Satna district is underlain by Vindhyan Shale, Limestone and Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 752016 ha of geographical area, 672106 ha (89%) is ground water recharge worthy area and 779910 ha (11%) hilly area. There are nine number of assessment units (block) in the district which fall under non-command and command (Amarpatan, Nagod, Rampur baghelon, Sohawal, Uchehra blocks). Majhgawan, Nagod, Ramnagar and Unchehra blocks of the district are categorized as safe. While Amarpatan, Maihar, Rampur Baghelon and Sohawal blocks as semi critical. The highest stage of ground water Extraction is computed as 89.32% in Rampur Baghelon. The annual extractable ground water resource in the district is 69018 ham and ground water extraction for all uses is 39418 ham, making stage of ground water development 65.59% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 25470 ham.

### **5.41 SEHORE**

Sehore district is underlain by Basaltic lava flows of Deccan trap, Vindhyan Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 657800 ha of geographical area, 463972 ha (70%) is ground water recharge worthy area and 193828ha (30%) is hilly area. There are five number of assessment units (block) in the district which fall under non-command (80%) and command (20% Ashta, Budhni, Ichawar, Nasrullahganj & Sehore) sub units. Ashta block of the district are categorized as critical and rest of the blocks are safe. The highest stage of ground water development is computed as 93.50% Ashta block. The annual extractable ground water

resource in the district 67494 ham and ground water extraction for all uses is 39055 ham, making stage of ground water extraction 61.78% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 25606 ham.

#### **5.42 SEONI**

Seoni district is underlain by Deccan trap basalts and Archaeans granite-gneisses. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 875800 ha of geographical area, 805020 ha (92%) is ground water recharge worthy area and 70780 ha (8 %) is hilly area. There are eight number of assessment units (block) in the district which fall under non-command (91%) and command (9% Barghat, Dhanora, Keolari and Seoni) sub units. All the blocks of the district are categorized as safe blocks. Chhapara is with highest stage of ground water extraction is computed as 69.64%. The annual extractable ground water resource in the district is 68393 ham and ground water extraction for all uses is 24963 ham, making stage of ground water extraction 41.38% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 39891 ham.

#### **5.43 SHAHDOL**

Shahdol district is underlain by Archaeans granite-gneisses, Gondwanas sandstone-clays, Lametas and Deccan trap basalts. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 584100 ha of geographical area, 497800 ha (85%) is ground water recharge worthy area and 86300 ha (15%) is hilly area. There are five number of assessment units (block) in the district which fall under non-command & command (Beohari) category. All blocks of the district are categorized as safe blocks, and highest stage of ground water extraction is computed as 25.38% for Sohagpur Block. The annual extractable ground water resource in the district is 53172 ham and ground water extraction for all uses is 3124 ham, making stage of ground water extraction 13.36% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 45933 ham.

#### **5.44 SHAJAPUR**

Shajapur district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year - 2023 on block-wise basis. Out of 347325 ha of geographical area, 340617 ha (98%) is ground water recharge worthy area and 6,708 ha (2%) is hilly area. There are four number of assessment units (blocks) in the district which fall under non-command. Mohan Berodia, and Kalapipal units are categorized

as over-exploited, whereas Shajapur unit is categorized as semi-critical of the district. The highest stage of ground water extraction is computed as 126.69% in Mohan Berodia block. The annual extractable ground water availability in the district is 51468 ham and ground water extraction for all uses is 52782 ham, making stage of ground water extraction 106.89 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 2116 ham.

#### **5.45 SHEOPUR**

Sheopur district is underlain by Vindhyan Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 660600 ha of geographical area, 533480 ha (81%) is ground water recharge worthy area and 127120 ha (19%) is hilly area. There are three number of assessment units (blocks) in the district which fall under non-command (87%) and two (Sheopur and Vijaypur) under command (13%) sub units. Karhal and Sheopur are categorises as safe and Vijayur is categorised as semi critical in this year. The highest stage of ground water extraction is computed as 71.81% in Vijaypur block. The annual extractable ground water availability in the district 50674 ham and ground water extraction for all uses is 17631 ham, making stage of ground water extraction 38.47% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 31029 ham.

#### **5.46 SHIVPURI**

Shivpuri district is underlain by Budelkhand Granite, Basaltic lava flows of Deccan trap Vindhyan Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year – 2023 on block-wise basis. Out of 1027800 ha of geographical area, 977049 ha (95%) is ground water recharge worthy area and 50,751 ha (5%) is hilly area. There are eight number of assessment units (block) in the district which fall under non-command (93%) and seven also under command (7%) sub units. Karera, Shivpuri and Pohri blocks are categorized as safe whereas Badarwas, Khaniyadhana, Kolaras, Narwar and Pichor blocks of the district are categorized as semi critical. The highest stage of ground water extraction is computed as 83.83% in Khaniyadhana block. The annual extractable ground water availability in the district 78319 ham and ground water extraction for all uses is 48288 ham, making stage of ground water extraction 67.67% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 24939 ham.

#### **5.47 SIDHI**

Sidhi district is underlain by Vindhyan limestone sandstone, Archaean granite Gondwana sandstone and Alluvium Dynamic ground water resources of the district have been estimated for base year-2023 on block-wise basis. Out of 485400 ha of geographical area, 360405 ha (74%) is ground water recharge worthy area and 124995 ha (26%) is hilly area. There are five number of assessment units (block) in the district which fall under non-command (87%) and three under command (13%) sub units. All blocks of the district are categorized as safe. The highest stage of ground water extraction is computed as 67.69% Sidhi block. The annual extractable ground water availability in the district 29212 ham and ground water extraction for all uses is 7552 ham, making stage of ground water extraction 36.11% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 18414 ham.

#### **5.48 SINGRAULI**

Singrauli district is underlain by Archaean granite and Gondwana sandstone. Dynamic ground water resources of the district have been estimated for base year -2023 on block-wise basis. Out of 567200 ha of geographical area, 451260 ha (80%) is ground water recharge worthy area and 115940 ha (20%) is hilly area. There are three number of assessment units (block) in the district which fall under non-command (86%) and two under command (14% -Deosar, Waidhan) sub units. All the blocks of the district are categorized as safe. The highest stage of ground water extraction is computed as 44.06% in Waidhan block. The annual extractable water availability in the district 35457 ham and ground water extraction for all uses is 8979 ham, making stage of ground water extraction 39.08% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 21311 ham.

#### **5.49 TIKAMGARH**

Tikamgarh district is occupied by Bundelkhand granite with a thin soil cover. Dynamic ground water resources of the district have been estimated for base year-2023 on block-wise basis. Out of 348338 ha of geographical area 335538 ha (97%) is ground water recharge worthy area and 12800 ha (3%) is hilly area. There are six number of assessment units (blocks) in the district which fall under non-command (92%) and command (8%) sub units. All blocks of the district are categorized as semi critical category. Highest stage of ground water extraction is computed as 87.43% for Jatara block. The annual extractable ground water availability in the district 36628 ham and ground water extraction for all uses is 26734 ham, making stage of ground

water extraction 81.83% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 5948 ham.

#### **5.50 UJJAIN**

Ujjain district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year-2023 on block-wise basis. Out of 613023 ha of geographical area, 593933 ha (97%) is ground water recharge worthy area and 19090 ha (3%) is hilly area. There are six number of assessment units (blocks) in the district which fall under non-command (100 %). Mahidpur, Tarana and Khachrod blocks of the district are categorized as semi critical. Badnagar, Ghatia and Ujjain blocks are categorized as over exploited. The highest stage of ground water extraction is computed as 151.30% in Ujjain block. The annual extractable ground water resource in the district is 91373 ham and ground water extraction for all uses is 95485 ham, making stage of ground water extraction 108.83% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 8999 ham.

#### **5.51 UMARIA**

Umaria district is underlain by Gondwana sandstone, Archaeans granite-gneisses, -clays, Lametas and Deccan trap basalts. Dynamic ground water resources of the district have been estimated for base year-2023 on block-wise basis. Out of 453900 ha of geographical area, 421900 ha (93%) is ground water recharge worthy area and 32,000 ha (7%) is hilly area. There are three number of assessment units (blocks) in the district which fall under non-command category. All blocks of the district are categorized as safe blocks, and highest stage of ground water extraction is computed as 28.12% for Karkeli Block. The annual extractable ground water resource in the district is 34239 ham and ground water extraction for all uses is 4294 ham, making stage of ground water extraction 18.71 % as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future irrigation use is 27689 ham.

#### **5.52 VIDISHA**

Vidisha district is underlain by Basaltic lava flows of Deccan trap and Vindhyan Sandstone. Dynamic ground water resources of the district have been estimated for base year-2023 on block-wise basis. Out of 737100 ha of geographical area, 670770 ha (92%) is ground water recharge worthy area and 66,330 ha (8%) is hilly area. There are seven number of assessment units (block) in the district which fall under non-command (89%) and command (11%) sub units. Five blocks of the district are under safe category whereas two blocks are falling in Semi-

Critical Category. The highest stage of ground water extraction is computed as 75.80% in Kurwai block. The annual extractable ground water resource in the district 85443 ham and ground water extraction for all uses is 51046 ham, making stage of ground water extraction 64.40% as a whole for district. After making allocation for future domestic supply for year 2025, balance available ground water for future use would be 30123 ham.

## **CHAPTER 6**

### **5.0 CONCLUSIONS**

- GEC-2015 methodology has been developed for prevalent Indian conditions, on the basis of terrain characteristics and data availability. INDIA-GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN- GRES) is a Software/Web-based Application developed by CGWB in collaboration with IIT-Hyderabad for assessment of ground water resources using GEC 2015 Methodology. Constraints in data availability have been overcome through realistic assumptions based on experience in the state.
- A conscious effort is required on the parts of the State/ Central agencies to acquire the requisite realistic data to map the changing groundwater scenario in the state.
- Total Annual Ground Water Recharge in the state (2023) has been assessed as 35.47 billion cubic meters (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 76% of the Total Annual Ground Water Recharge.
- The Total Annual Extractable Ground Water Resource of the country has been assessed as 32.85 billion cubic meters (bcm), after keeping a provision for natural discharge.
- The Annual Ground Water Extraction of the state (2023) is 19.30 billion cubic meters (bcm), the largest user being irrigation sector.
- The Stage of ground water extraction for the entire state, which is the percentage of groundwater extraction with respect to Annual Extractable Ground Water Recharge, has been computed as 58.75%. The extraction pattern of ground water is not uniform across the state, resulting in ground water stressed conditions in some parts of the state while in some other areas; ground water extraction has been sub- optimal.
- Out of the total 317 assessment units (Blocks/ Urban areas) in the state, 26 units (8%) have been categorized as 'Over- Exploited', 5 units (2%) have been categorized as 'Critical', 50 units (19%) have been categorized as 'Semi-Critical' and 226 units (71%) have been categorized as 'Safe.'
- Out of 32853.75 mcm of Total Annual Extractable Resources of the state, 3424.26 mcm (10.42 %) are under 'Over-Exploited', 537.1 mcm (1.63 %) are under

‘Critical’, 6119.62 mcm (18.63 %) are under ‘Semi-Critical’, 22772.77 mcm (69.32 %) are under ‘Safe’ category assessment units.

- Out of 269333.27 Sq Km of Recharge worthy area of the state, 22554.86 Sq Km (8.37 %) are under ‘Over-Exploited’, 4249.07 Sq Km (1.58 %) are under ‘Critical’, 51803.76 Sq Km (19.23 %) are under ‘Semi-Critical’, 190725.58 Sq Km (70.81%) are under ‘Safe’ category assessment units.
- Almost all over-exploited assessment units falling in western part of Madhya Pradesh, which is known as “MALWA AREA” where ground water extraction has increased many folds during past decades.
- The total Annual Ground Water Recharge for the entire state, as in 2023 has increased by 0.23 bcm as compared to the last assessment (2022). The total Annual Extractable Ground Water Resources has also increased by 0.27 bcm. The Annual Ground Water Extraction for irrigation, domestic and Industrial uses increased by 0.05 bcm during this period. These variations are attributed mainly to to increased rainfall recharge, the implementation of water conservation structures, increase in the abstraction structures and increase in population, and changing ground water regime.
- It is further added that in the assessment units with low the ground water potential as indicated in ‘Unit recharge map’ (Fig 4.6), the ground water extraction is also less, thereby rendering these units as ‘Safe’. Similarly, in the assessment units with good ground water potential, the ground water extraction is high which has resulted into Over-exploitation over a period. The water augmentation efforts can be successful in such areas, where the ground water potential is high and there is scope for augmentation.

## **6.1 INFERENCES FROM GROUND WATER RESOURCE ASSESSMENT**

An analysis of assessment results leads us to the following inferences as the way forward in the assessment of Ground water resources.

### **6.1.1 Water balance Studies**

Ground water is one of the several components of the Hydrologic Cycle, other important components being rainfall, surface water, soil moisture and evapotranspiration. Holistic water resources management interventions require proper understanding of the interactions between the different components of the hydrosphere. Studies for determining the Base flow and lateral flow components in the Water Balance equation need to be taken up to bring more accuracy to the Ground Water Resources Assessment.

### **6.1.2 Aquifer Charactersation and Parameter Estimation**

One of the key elements that determine the accuracy of ground water resources assessment is the realistic estimation of the recharge and discharge parameters. It is recommended that more experimental studies be taken up for refining the norms of RIF, return flow from irrigation based on soil types and agro-climatic zone, recharge from water conservation and water bodies and more field studies for evaluation of specific yield values as well as its variation with depth.

### **6.1.3 Case Studies Linking Assessment with Management**

It is recommended to take up case studies in various assessment units wherein quantitative evaluation of the ground water management interventions and consequent changes in the assessment results could be analysed. Such studies would help bring out the efficacy of various management interventions on the ground water regime.

### **6.1.4 Temporal availability of Ground Water Resources**

Even though the GEC 2015 methodology advocates season-wise resource assessment, the estimation of recharge during monsoon and non-monsoon seasons may not be sufficient. Temporal variations in groundwater availability, particularly in hard rock terrain are not reflected in present practices. Hence, the assessment of temporal availability of ground water resources on the basis of available water columns can be attempted by considering the water levels measured frequently using Digital Water Level Recorders (DWLRs).

### **6.1.5 Creation of Database for Ground Water Resources Assessment and its Regular updating**

GEC 2015 has devised the data structure of all the data elements (like water level, rainfall etc.) and norms (like Specific Yield, Rainfall Infiltration Factor etc.) with its name, type of data and its precision. The templates (excel sheets) for data collection/compilation for assessment through IN- GRES using GEC 2015 has also been devised. However, major challenges are lack of dedicated manpower as well as presence of State GW/Nodal Departments (in majority of States) at Districtlevel for understanding/analysis of data/information to be collected/compiled from different State Departments (like Agriculture, Irrigation, Water Supply, Industries, Water Conservation etc.). Of particular importance in this regard are data/information related to recharge from water bodies, water conservation/harvesting structures, return flow from applied irrigation and details of ground water extraction structures in use for irrigation, domestic and industrial purpose. These need to be collected/compiled and regularly updated at district/block level so that more realistic assessment of ground water resources could be accomplished.

### **6.1.6 Aquifer- Stream Interactions**

Additional studies on aquifer-stream interactions are required to understand the contribution of ground water to streams and the requirement of environmental flows for sustainability of water resources and surrounding ecosystem.

### **6.1.7 Ground Water Modelling and Predictive Simulation**

Besides the assessment of the dynamic ground water resources using norms prescribed in GEC 2015 methodology through automation, the concept of Ground water modelling must be included where predictive simulation can also be done. This would give an idea of the future availability of Ground water resources with respect to the changing climate and extraction patterns.

## **6.2 RECCOMENDATIONS**

The dependency on groundwater has increased many folds during the recent years and the groundwater extraction for irrigation, domestic and industries have resulted in lowering of water levels, long-term water level declining trend and even drying up of wells. The best option lies in improving the recharge component in any well-defined administrative or natural boundary (Block/ Water shed) by an integrated scientific approach with people participatory program. Such program also needs to include cost effective structures and best practices possible without deteriorating the existing surface and ground water resources in terms of quantity and quality. In order to regulate the groundwater extraction, Central Ground Water Board in association with Ground Water Survey, Water Resource Department has computed Dynamic Groundwater Resources and categorized blocks as Over Exploited, Critical, Semi Critical and Safe.

Hence, there is an urgent need to implement artificial recharge schemes to augment ground water so that artificial recharge would be a part of Sustainable Management of ground water. The guidelines which can be used in the formulation of scheme proposal can be enumerated as follows.

### **Criteria for selection of priority area**

1. Area characterized by significant declining post monsoon long term water level trend
2. Area characterized by deeper post monsoon water level.
3. The area having high stage of groundwater extraction and categorized as Over Exploited, Critical ground water assessment units.
4. The aquifer under stress needs to be considered for artificial recharge specially the weathered, fractured and jointed basaltic formations of malwa regions and priority also

be given for recharging at the recharge area of the confined aquifer, viz., crystalline-sedimentary contacts, palaeo-channels, upstream side of fractures/lineaments.

**Annexure-I: assessment unit wise area Details**

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
<b>1</b>	<b>AGAR MALWA</b>					
	AGAR	11375	54071	65446	6994	72440
	BADOD	0	70083	70083	3515	73598
	NALKHEDA	0	56217	56217	4515	60732
	SUSNER	0	59830	59830	5593	65423
	<b>DISTRICT TOTAL</b>	<b>11375</b>	<b>240201</b>	<b>251576</b>	<b>20617</b>	<b>272193</b>
<b>2</b>	<b>ALIRAJPUR</b>					
	ALIRAJPUR	0	63900	63900	2500	66400
	BHABRA	0	31300	31300	2700	34000
	JOBAT	0	36900	36900	2000	38900
	KATTHIWARA	0	51600	51600	11700	63300
	SONDWA	0	87400	87400	4800	92200
	UDAIGARH	0	34300	34300	2700	37000
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>305400</b>	<b>305400</b>	<b>26400</b>	<b>331800</b>
<b>3</b>	<b>ANUPPUR</b>					
	ANUPPUR	0	55700	55700	3300	59000
	JAITHARI	0	84000	84000	13000	97000
	KOTMA	0	34000	34000	6000	40000
	PUSHPARAJGARH	0	120500	120500	55900	176400
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>294200</b>	<b>294200</b>	<b>78200</b>	<b>372400</b>
<b>4</b>	<b>ASHOKNAGAR</b>					
	ASHOKNAGAR	3506	121297	124803	0	124803
	CHANDERI	4799	104071	108870	4200	113070
	ISAGARH	3435	103680	107115	0	107115
	MUNGAOLI	8910	112546	121456	950	122406
	<b>DISTRICT TOTAL</b>	<b>20650</b>	<b>441594</b>	<b>462244</b>	<b>5150</b>	<b>467394</b>
<b>5</b>	<b>BALAGHAT</b>					
	BAIHAR	0	127451	127451	1709	129160
	BALAGHAT	18890	103066	121956	263	122219
	BIRSA	0	135798	135798	5745	141543
	KATANGI	11442	56237	67679	2100	69779
	KHAIRLANJI	13658	31730	45388	3400	48788
	KIRNAPUR	0	76240	76240	4800	81040
	LALBARRA	20858	49374	70232	1360	71592
	LANJI	21423	64473	85896	1230	87126
	PARASWADA	0	116750	116750	7300	124050

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	WARASEONI	15232	29171	44403	3200	47603
	<b>DISTRICT TOTAL</b>	<b>101503</b>	<b>790290</b>	<b>891793</b>	<b>31107</b>	<b>922900</b>
<b>6</b>	<b>BARWANI</b>					
	BARWANI	14552	41248	55800	20910	76710
	NIWALI	470	35091	35561	24049	59610
	PANSEMAL	4489	24691	29180	29860	59040
	PATI	1040	21552	22592	48628	71220
	RAJPUR	21413	51623	73036	4354	77390
	SENDHWA	9275	69472	78747	43783	122530
	THIKRI	17473	54442	71915	3785	75700
	<b>DISTRICT TOTAL</b>	<b>68712</b>	<b>298119</b>	<b>366831</b>	<b>175369</b>	<b>542200</b>
<b>7</b>	<b>BETUL</b>					
	AMLA	6438	101862	108300	3700	112000
	ATHNER	1457	51843	53300	32000	85300
	BETUL	3840	99160	103000	12000	115000
	BHAINSDEHI	2179	99821	102000	23700	125700
	BHIMPUR	0	97800	97800	17200	115000
	CHICHOLI	1336	38514	39850	9550	49400
	GHODA DONGRI	1560	112440	114000	16000	130000
	MULTAI	4850	82250	87100	21000	108100
	PRABHAT PATTAN	3326	103274	106600	6700	113300
	SHAHPUR	1262	43238	44500	6000	50500
	<b>DISTRICT TOTAL</b>	<b>26248</b>	<b>830202</b>	<b>856450</b>	<b>147850</b>	<b>1004300</b>
<b>8</b>	<b>BHIND</b>					
	ATER	16074	45126	61200	0	61200
	BHIND	25614	50586	76200	0	76200
	GOHAD	42770	60030	102800	0	102800
	LAHAR	31112	34488	65600	0	65600
	MEHGAON	31257	65643	96900	0	96900
	RON	33064	10136	43200	0	43200
	<b>DISTRICT TOTAL</b>	<b>179891</b>	<b>266009</b>	<b>445900</b>	<b>0</b>	<b>445900</b>
<b>9</b>	<b>BHOPAL</b>					
	BERASIA	0	136400	136400	6000	142400
	BHOPAL URBAN	0	38293	38293	4207	42500
	PHANDA	0	90107	90107	2230	92337
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>264800</b>	<b>264800</b>	<b>12437</b>	<b>277237</b>
<b>10</b>	<b>BURHANPUR</b>					

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	BURHANPUR	5866	111134	117000	61600	178600
	KHAKNAR	5423	134627	140050	4650	144700
	<b>DISTRICT TOTAL</b>	<b>11289</b>	<b>245761</b>	<b>257050</b>	<b>66250</b>	<b>323300</b>
<b>11</b>	<b>CHHATARPUR</b>					
	BADA MALHERA	8862	80638	89500	18735	108235
	BIJAWAR	1004	140839	141843	17200	159043
	BUXWAHA	1718	77395	79113	10920	90033
	CHHATARPUR	15093	78296	93389	12500	105889
	GAURIHAR	31119	59873	90992	1160	92152
	LAUNDI	18007	64254	82261	1920	84181
	NOWGAON	16033	66228	82261	9107	91368
	RAJNAGAR	24804	106271	131075	6760	137835
	<b>DISTRICT TOTAL</b>	<b>116640</b>	<b>673794</b>	<b>790434</b>	<b>78302</b>	<b>868736</b>
<b>12</b>	<b>CHHINDWARA</b>					
	AMARWARA	0	93955	93955	8245	102200
	BICHHUA	0	41384	41384	11316	52700
	CHAURAI	0	113973	113973	3227	117200
	CHHINDWARA	0	63516	63516	4784	68300
	HARRAI	0	127238	127238	83462	210700
	JAMAI	0	96604	96604	45796	142400
	MOHKHEDA	6380	64506	70886	6614	77500
	PANDHURNA	0	87186	87186	10014	97200
	PARASIA	0	69020	69020	9680	78700
	SAUSAR	6931	62382	69313	11487	80800
	TAMIA	0	51702	51702	102098	153800
	<b>DISTRICT TOTAL</b>	<b>13311</b>	<b>871466</b>	<b>884777</b>	<b>296723</b>	<b>1181500</b>
<b>13</b>	<b>DAMOH</b>					
	BATIYAGARH	4095	85087	89182	33318	122500
	DAMOH	13815	71085	84900	45500	130400
	HATTA	3998	45102	49100	37400	86500
	JABERA	12038	51362	63400	62800	126200
	PATERA	5851	51849	57700	14600	72300
	PATHARIA	4383	85954	90337	6663	97000
	TENDULHEDA	13487	26513	40000	55700	95700
	<b>DISTRICT TOTAL</b>	<b>57667</b>	<b>416952</b>	<b>474619</b>	<b>255981</b>	<b>730600</b>
<b>14</b>	<b>DATIA</b>					
	BHANDER	41252	23248	64500	1100	65600
	DATIA	42937	66163	109100	1800	110900

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	SEONDHA	47908	44692	92600	0	92600
	<b>DISTRICT TOTAL</b>	<b>132097</b>	<b>134103</b>	<b>266200</b>	<b>2900</b>	<b>269100</b>
<b>15</b>	<b>DEWAS</b>					
	BAGLI	3848	177000	180848	23692	204540
	DEWAS	0	99961	99961	783	100744
	KANNOD	14696	73396	88092	58208	146300
	KHATEGAON	0	87631	87631	26869	114500
	SONKUTCH	0	58120	58120	9980	68100
	TONKKHURD	0	62430	62430	5470	67900
	<b>DISTRICT TOTAL</b>	<b>18544</b>	<b>558538</b>	<b>577082</b>	<b>125002</b>	<b>702084</b>
<b>16</b>	<b>DHAR</b>					
	BADNAWAR	3420	100320	103740	2660	106400
	BAGH	4007	47193	51200	0	51200
	DAHI	2932	45268	48200	0	48200
	DHAR	0	60200	60200	0	60200
	DHARMPURI	28731	14169	42900	0	42900
	GANDHWANI	10733	62867	73600	0	73600
	KUKSHI	3377	30923	34300	0	34300
	MANAWAR	31555	23945	55500	0	55500
	NALCHHA	975	77425	78400	0	78400
	NISARPUR	20850	14450	35300	0	35300
	SARDARPUR	17730	110270	128000	0	128000
	TIRLA	0	53400	53400	0	53400
	UMARVAN	24760	23140	47900	0	47900
	<b>DISTRICT TOTAL</b>	<b>149070</b>	<b>663570</b>	<b>812640</b>	<b>2660</b>	<b>815300</b>
<b>17</b>	<b>DINDORI</b>					
	AMARPUR	0	44800	44800	11200	56000
	BAJANG	0	43600	43600	10900	54500
	DINDORI	0	94160	94160	23540	117700
	KARANJIYA	0	56480	56480	14120	70600
	MENHADWANI	0	52800	52800	15700	68500
	SAMNAPUR	0	52320	52320	13080	65400
	SHAHPURA	0	111840	111840	27960	139800
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>456000</b>	<b>456000</b>	<b>116500</b>	<b>572500</b>
<b>18</b>	<b>GUNA</b>					
	ARON	0	78883	78883	0	78883
	BAMORI	12640	145508	158148	700	158848
	CHACHAURA	5417	112815	118232	1086	119318

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	GUNA	4768	139347	144115	13700	157815
	RAGHOGARH	14384	103752	118136	6000	124136
	<b>DISTRICT TOTAL</b>	<b>37209</b>	<b>580305</b>	<b>617514</b>	<b>21486</b>	<b>639000</b>
<b>19</b>	<b>GWALIOR</b>					
	BHITARWAR	53133	30767	83900	6100	90000
	DABRA	60100	31200	91300	6100	97400
	GHATIGAON	17900	113090	130990	15900	146890
	GWALIOR URBAN	0	42335	42335	0	42335
	MORAR	0	79775	79775	0	79775
	<b>DISTRICT TOTAL</b>	<b>131133</b>	<b>297167</b>	<b>428300</b>	<b>28100</b>	<b>456400</b>
<b>20</b>	<b>HARDA</b>					
	HARDA	45650	46000	91650	13350	105000
	KHIRKIYA	0	79440	79440	44560	124000
	TIMARNI	33500	65500	99000	5000	104000
	<b>DISTRICT TOTAL</b>	<b>79150</b>	<b>190940</b>	<b>270090</b>	<b>62910</b>	<b>333000</b>
<b>21</b>	<b>HOSHANGABAD</b>					
	BABAI	89200	0	89200	0	89200
	BANKHEDI	0	66900	66900	12000	78900
	HOSHANGABAD	57400	0	57400	9500	66900
	KESALA	16570	64685	81255	7045	88300
	PIPARIYA	17000	69300	86300	12000	98300
	SEONI MALWA	58080	75827	133907	3593	137500
	SHOHAGPUR	15373	28017	43390	67910	111300
	<b>DISTRICT TOTAL</b>	<b>253623</b>	<b>304729</b>	<b>558352</b>	<b>112048</b>	<b>670400</b>
<b>22</b>	<b>INDORE</b>					
	DEPALPUR	1832	99127	100959	3241	104200
	INDORE	0	49821	49821	1179	51000
	INDORE URBAN	0	53000	53000	0	53000
	MHOW	3544	98548	102092	2608	104700
	SAWER	0	76025	76025	875	76900
	<b>DISTRICT TOTAL</b>	<b>5376</b>	<b>376521</b>	<b>381897</b>	<b>7903</b>	<b>389800</b>
<b>23</b>	<b>JABALPUR</b>					
	BARGI	13640	27350	40990	31804	72794
	JABALPUR URBAN	0	36840	36840	2609	39449
	KUNDAM	0	83200	83200	37800	121000
	MAJHOLI	0	62265	62265	0	62265
	PANAGAR	7500	19180	26680	0	26680

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	PATAN	29902	70498	100400	0	100400
	SHAHPURA	17834	29275	47109	6012	53121
	SIHORA	12000	34384	46384	0	46384
	<b>DISTRICT TOTAL</b>	<b>80876</b>	<b>362992</b>	<b>443868</b>	<b>78225</b>	<b>522093</b>
<b>24</b>	<b>JHABUA</b>					
	JHABUA	0	41300	41300	2700	44000
	MEGHNAGAR	0	45400	45400	4800	50200
	PETLAWAD	17018	74635	91653	6047	97700
	RAMA	0	45700	45700	13700	59400
	RANAPUR	0	38400	38400	2000	40400
	THANDLA	0	48800	48800	5500	54300
	<b>DISTRICT TOTAL</b>	<b>17018</b>	<b>294235</b>	<b>311253</b>	<b>34747</b>	<b>346000</b>
<b>25</b>	<b>KATNI</b>					
	BADWARA	9278	83580	92858	1342	94200
	BAHORIBAND	9348	88552	97900	0	97900
	DHIMAR KHEDA	0	84120	84120	8380	92500
	MURWARA	9278	56922	66200	0	66200
	RITHI	5500	45770	51270	12230	63500
	VIJAYRAGHAVGARH	0	74300	74300	800	75100
	<b>DISTRICT TOTAL</b>	<b>33404</b>	<b>433244</b>	<b>466648</b>	<b>22752</b>	<b>489400</b>
<b>26</b>	<b>KHANDWA</b>					
	BALDI	0	54524	54524	57176	111700
	CHHEGAONMAKHAN	3555	82545	86100	900	87000
	HARSUD	0	53847	53847	46203	100050
	KHALWA	0	97000	97000	51900	148900
	KHANDWA	4084	78391	82475	625	83100
	PANDHANA	18501	98499	117000	10200	127200
	PUNASA	66420	24080	90500	4000	94500
	<b>DISTRICT TOTAL</b>	<b>92560</b>	<b>488886</b>	<b>581446</b>	<b>171004</b>	<b>752450</b>
<b>27</b>	<b>KHARGONE</b>					
	BARWAHA	35020	98260	133280	13720	147000
	BHAGWANPURA	7917	44481	52398	79402	131800
	BHIKANGAON	17708	73772	91480	0	91480
	GOGAWAN	9693	31017	40710	0	40710
	JHIRANYA	5442	61027	66469	52431	118900
	KASRAWAD	44357	56843	101200	0	101200

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	KHARGONE	8510	40930	49440	0	49440
	MAHESHWAR	24134	58486	82620	0	82620
	SEGAON	4137	35163	39300	550	39850
	<b>DISTRICT TOTAL</b>	<b>156918</b>	<b>499979</b>	<b>656897</b>	<b>146103</b>	<b>803000</b>
<b>28</b>	<b>MANDLA</b>					
	BICHHIYA	5038	82882	87920	21980	109900
	BIJADANDI	0	60880	60880	15220	76100
	GHUGHARI	0	88080	88080	22020	110100
	MANDLA	7897	41463	49360	12340	61700
	MAWAI	0	117040	117040	29260	146300
	MOHGAON	0	32780	32780	9120	41900
	NAINPUR	18135	45715	63850	15950	79800
	NARAYANGANJ	0	35200	35200	8800	44000
	NIWAS	0	38880	38880	45720	84600
	<b>DISTRICT TOTAL</b>	<b>31070</b>	<b>542920</b>	<b>573990</b>	<b>180410</b>	<b>754400</b>
<b>29</b>	<b>MANDSAUR</b>					
	BHANPURA	20590	30058	50648	54470	105118
	GAROTH	25843	87177	113020	0	113020
	MALHARGARH	12931	67284	80215	416	80631
	MANDSAUR	4986	120700	125686	922	126608
	SITAMAU	9738	116333	126071	1558	127629
	<b>DISTRICT TOTAL</b>	<b>74088</b>	<b>421552</b>	<b>495640</b>	<b>57366</b>	<b>553006</b>
<b>30</b>	<b>MORENA</b>					
	AMBAH	51100	0	51100	0	51100
	JAORA	29553	27742	57295	11300	68595
	KAILARAS	29144	23150	52294	0	52294
	MORENA	45485	55615	101100	5600	106700
	PAHADGARH	25200	47800	73000	19200	92200
	PORSA	25307	20393	45700	9300	55000
	SABALGARH	19000	39000	58000	13000	71000
	<b>DISTRICT TOTAL</b>	<b>224789</b>	<b>213700</b>	<b>438489</b>	<b>58400</b>	<b>496889</b>
<b>31</b>	<b>NARSINGHPUR</b>					
	CHAWARPATHA	0	91900	91900	1400	93300
	CHICHLI	0	85600	85600	10400	96000
	GOTEGAON	20900	51900	72800	0	72800
	KARELI	13238	70162	83400	9900	93300
	NARSINGHPUR	18631	65769	84400	12500	96900
	SAIKHEDA	0	61000	61000	0	61000

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	<b>DISTRICT TOTAL</b>	<b>52769</b>	<b>426331</b>	<b>479100</b>	<b>34200</b>	<b>513300</b>
<b>32</b>	<b>NEEMUCH</b>					
	JAWAD	6502	150442	156944	5000	161944
	MANASA	6836	108464	115300	34300	149600
	NEEMUCH	4638	98862	103500	5000	108500
	<b>DISTRICT TOTAL</b>	<b>17976</b>	<b>357768</b>	<b>375744</b>	<b>44300</b>	<b>420044</b>
<b>33</b>	<b>NIWARI</b>					
	NIWARI	5289	53311	58600	2000	60600
	PRITHVIPUR	7541	86421	93962	1900	95862
	<b>DISTRICT TOTAL</b>	<b>12830</b>	<b>139732</b>	<b>152562</b>	<b>3900</b>	<b>156462</b>
<b>34</b>	<b>PANNA</b>					
	AJAIGARH	2762	87168	89930	1125	91055
	GUNNOR	2790	111227	114017	1600	115617
	PANNA	13514	184839	198353	6900	205253
	PAWAI	4738	132338	137076	20500	157576
	SHAHNAGAR	8908	114191	123099	20900	143999
	<b>DISTRICT TOTAL</b>	<b>32712</b>	<b>629763</b>	<b>662475</b>	<b>51025</b>	<b>713500</b>
<b>35</b>	<b>RAISEN</b>					
	BADI	58600	83200	141800	100	141900
	BEGAMGANJ	0	89300	89300	1900	91200
	GAIRATGANJ	0	74600	74600	17400	92000
	OBEDULLAGANJ	0	86440	86440	88500	174940
	SANCHI	0	105000	105000	31000	136000
	SILWANI	0	99600	99600	29300	128900
	UDAIPURA	0	64200	64200	17500	81700
	<b>DISTRICT TOTAL</b>	<b>58600</b>	<b>602340</b>	<b>660940</b>	<b>185700</b>	<b>846640</b>
<b>36</b>	<b>RAJGARH</b>					
	BIAORA	0	114800	114800	0	114800
	JIRAPUR	0	84498	84498	0	84498
	KHILCHIPUR	0	78400	78400	0	78400
	NARSINGHGARH	0	136800	136800	0	136800
	RAJGARH	0	110500	110500	0	110500
	SARANGPUR	0	90500	90500	0	90500
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>615498</b>	<b>615498</b>	<b>0</b>	<b>615498</b>
<b>37</b>	<b>RATLAM</b>					
	ALOT	0	94500	94500	0	94500
	BAJNA	8614	44886	53500	14700	68200
	JAORA	0	76300	76300	0	76300

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	PIPLODA	0	60400	60400	0	60400
	RATLAM	0	133100	133100	0	133100
	SAILANA	0	43800	43800	9800	53600
	<b>DISTRICT TOTAL</b>	<b>8614</b>	<b>452986</b>	<b>461600</b>	<b>24500</b>	<b>486100</b>
<b>38</b>	<b>REWA</b>					
	GANGEV	19423	39707	59130	0	59130
	HANUMANA	0	90470	90470	5600	96070
	JAWA	0	73400	73400	8000	81400
	MAUGANJ	0	44730	44730	8000	52730
	NAIGARHI	0	35790	35790	2000	37790
	RAMPUR KARCHULIYAN	19423	40387	59810	3000	62810
	REWA	25008	45412	70420	0	70420
	SIRMOUR	21510	64810	86320	5000	91320
	TEONTHAR	0	73690	73690	6000	79690
	<b>DISTRICT TOTAL</b>	<b>85364</b>	<b>508396</b>	<b>593760</b>	<b>37600</b>	<b>631360</b>
<b>39</b>	<b>SAGAR</b>					
	BANDA	3727	79403	83130	12170	95300
	BINA	410	81690	82100	500	82600
	DEORI	8997	77753	86750	14650	101400
	JAISINAGAR	2277	74213	76490	14810	91300
	KESLI	5789	60071	65860	13240	79100
	KHURAI	2199	88541	90740	2960	93700
	MALTHON	979	76901	77880	5920	83800
	RAHATGARH	1971	87097	89068	9432	98500
	REHLI	2137	99843	101980	10520	112500
	SAGAR	3187	104383	107570	9730	117300
	SHAHNAGAR	8380	55470	63850	5850	69700
	<b>DISTRICT TOTAL</b>	<b>40053</b>	<b>885365</b>	<b>925418</b>	<b>99782</b>	<b>1025200</b>
<b>40</b>	<b>SATNA</b>					
	AMARPATAN	2000	63231	65231	0	65231
	MAIHAR	0	94400	94400	18172	112572
	MAJHGAWAN	0	139912	139912	24970	164882
	NAGOD	1750	89750	91500	3500	95000
	RAMNAGAR	0	50354	50354	9700	60054
	RAMPUR-BAGHELAN	31250	46344	77594	9800	87394
	SOHAWAL	10442	66750	77192	0	77192

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	UNCHEHARA	1666	74257	75923	13768	89691
	<b>DISTRICT TOTAL</b>	<b>47108</b>	<b>624998</b>	<b>672106</b>	<b>79910</b>	<b>752016</b>
<b>41</b>	<b>SEHORE</b>					
	ASHTA	7707	110484	118191	26066	144257
	BUDNI	29876	29897	59773	47738	107511
	ICHHAWAR	12022	40483	52505	58580	111085
	NASRULLAGANJ	35009	53833	88842	47680	136522
	SEHORE	10945	133716	144661	13764	158425
	<b>DISTRICT TOTAL</b>	<b>95559</b>	<b>368413</b>	<b>463972</b>	<b>193828</b>	<b>657800</b>
<b>42</b>	<b>SEONI</b>					
	BARGHAT	12285	56885	69170	2830	72000
	CHHAPARA	0	63240	63240	9860	73100
	DHANORA	11951	48949	60900	5800	66700
	GHANSAUR	0	83790	83790	12510	96300
	KEOLARI	25430	51840	77270	5430	82700
	KURAI	0	166970	166970	11330	178300
	LAKHNADON	0	154480	154480	15920	170400
	SEONI	22290	106910	129200	7100	136300
	<b>DISTRICT TOTAL</b>	<b>71956</b>	<b>733064</b>	<b>805020</b>	<b>70780</b>	<b>875800</b>
<b>43</b>	<b>SHAHDOL</b>					
	BEOHARI	5047	89453	94500	16500	111000
	BURHAR	0	111400	111400	23300	134700
	GOHPARU	0	81000	81000	12500	93500
	JAISINGHNAGAR	0	135900	135900	28000	163900
	SOHAGPUR	0	75000	75000	6000	81000
	<b>DISTRICT TOTAL</b>	<b>5047</b>	<b>492753</b>	<b>497800</b>	<b>86300</b>	<b>584100</b>
<b>44</b>	<b>SHAJAPUR</b>					
	KALAPIPAL	0	82567	82567	0	82567
	MOMAN BADODIYA	0	88176	88176	2229	90405
	SHAJAPUR	0	88307	88307	3479	91786
	SHUJALPUR	0	81567	81567	1000	82567
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>340617</b>	<b>340617</b>	<b>6708</b>	<b>347325</b>
<b>45</b>	<b>SHEOPUR</b>					
	KARAHAL	0	227180	227180	1520	228700
	SHEOPUR	60150	82450	142600	0	142600
	VIJAYPUR	11000	152700	163700	125600	289300
	<b>DISTRICT TOTAL</b>	<b>71150</b>	<b>462330</b>	<b>533480</b>	<b>127120</b>	<b>660600</b>

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
<b>46</b>	<b>SHIVPURI</b>					
	BADARWAS	3424	111752	115176	6424	121600
	KARERA	13022	86878	99900	1500	101400
	KHANIYADHANA	20650	102594	123244	5956	129200
	KOLARAS	0	107491	107491	7709	115200
	NARWAR	12617	80183	92800	5600	98400
	PICHHORE	14559	88325	102884	6216	109100
	POHARI	2399	149119	151518	5782	157300
	SHIVPURI	2750	181286	184036	11564	195600
	<b>DISTRICT TOTAL</b>	<b>69421</b>	<b>907628</b>	<b>977049</b>	<b>50751</b>	<b>1027800</b>
<b>47</b>	<b>SIDHI</b>					
	KUSMI	0	70617	70617	62783	133400
	MAJHOLI	0	66784	66784	6916	73700
	RAMPUR NAIKIN	17110	77944	95054	24346	119400
	SIDHI	9500	52450	61950	22450	84400
	SIHAWAL	22280	43720	66000	8500	74500
	<b>DISTRICT TOTAL</b>	<b>48890</b>	<b>311515</b>	<b>360405</b>	<b>124995</b>	<b>485400</b>
<b>48</b>	<b>SINGRAULI</b>					
	CHITRANGI	0	171250	171250	23350	194600
	DEOSAR	2150	137960	140110	42090	182200
	W Aidhan	4452	135448	139900	50500	190400
	<b>DISTRICT TOTAL</b>	<b>6602</b>	<b>444658</b>	<b>451260</b>	<b>115940</b>	<b>567200</b>
<b>49</b>	<b>TIKAMGARH</b>					
	BALDEOGARH	6579	75717	82296	3600	85896
	JATARA	7646	89014	96660	4200	100860
	PALERA	2468	69154	71622	3200	74822
	TIKAMGARH	10169	74791	84960	1800	86760
	<b>DISTRICT TOTAL</b>	<b>26862</b>	<b>308676</b>	<b>335538</b>	<b>12800</b>	<b>348338</b>
<b>50</b>	<b>UJJAIN</b>					
	BADNAGAR	0	123595	123595	0	123595
	GHATIA	0	64163	64163	0	64163
	KHCHROD	0	110178	110178	19090	129268
	MAHIDPUR	0	113453	113453	0	113453
	TARANA	0	106580	106580	0	106580
	UJJAIN	0	75964	75964	0	75964
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>593933</b>	<b>593933</b>	<b>19090</b>	<b>613023</b>
<b>51</b>	<b>UMARIA</b>					
	KARKELI	0	156000	156000	17000	173000

S. N	Assessment Unit	Total Geographical Area (ha)				
		Recharge Worthy Area (ha)			Hilly Area	Total
		Command Area	Non Command Area	Total		
	MANPUR	0	184600	184600	5300	189900
	PALI	0	81300	81300	9700	91000
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>421900</b>	<b>421900</b>	<b>32000</b>	<b>453900</b>
<b>52</b>	<b>VIDISHA</b>					
	BASODA	2241	106559	108800	13500	122300
	GYARASPUR	0	84100	84100	3100	87200
	KURWAI	0	81000	81000	2100	83100
	LATERI	0	89200	89200	9400	98600
	NATERAN	20211	77489	97700	15300	113000
	SIRONJ	13755	89945	103700	21800	125500
	VIDISHA	40080	66190	106270	1130	107400
	<b>DISTRICT TOTAL</b>	<b>76287</b>	<b>594483</b>	<b>670770</b>	<b>66330</b>	<b>737100</b>
	<b>STATE TOTAL (Ha)</b>	2952011	23981316	26933327	3890461	30823788
	<b>STATE TOTAL (Sq Km)</b>	<b>29520.11</b>	<b>239813.16</b>	<b>269333.27</b>	<b>38904.61</b>	<b>308237.88</b>

## Annexure II: Ground Water Recharge Scenario

S.N.	Assessment Unit	Recharge from Rainfall-Monsoon Season (Ham)	Recharge from Other Sources-Monsoon Season (Ham)	Recharge from Rainfall-Non Monsoon Season (Ham)	Recharge from Other Sources- Non Monsoon Season (Ham)	Total Annual Ground Water Recharge (Ham)	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)
<b>1</b>	<b>AGAR MALWA</b>							
	Agar	8334.04	639.23	0	2888.34	11861.61	1031.48	10830.13
	Badod	8730.68	551.85	0	1724.81	11007.34	550.37	10456.97
	Nalkheda	7456.04	696.72	0	2442.05	10594.81	1059.49	9535.32
	Susner	7236.25	716.23	0	2132.56	10085.04	504.25	9580.79
	<b>DISTRICT TOTAL</b>	<b>31757.01</b>	<b>2604.03</b>	<b>0</b>	<b>9187.76</b>	<b>43548.8</b>	<b>3145.59</b>	<b>40403.21</b>
<b>2</b>	<b>ALIRAJPUR</b>							
	Alirajpur	4552.42	166.06	0	409.75	5128.23	256.41	4871.82
	Bhabra	1579.05	115.57	0	275.92	1970.54	197.05	1773.49
	Jobat	1861.57	124.63	0	300.07	2286.27	228.63	2057.64
	Katthiwara	2603.17	93.44	0	249.2	2945.81	294.58	2651.23
	Sondwa	6198.36	118.42	0	337.74	6654.52	332.73	6321.79
	Udaigarh	2082.3	152.81	0	269.59	2504.7	250.47	2254.23
	<b>DISTRICT TOTAL</b>	<b>18876.87</b>	<b>770.93</b>	<b>0</b>	<b>1842.27</b>	<b>21490.07</b>	<b>1559.87</b>	<b>19930.2</b>
<b>3</b>	<b>ANUPPUR</b>							
	Anuppur	6927.9	29.48	514.94	40.64	7512.96	375.65	7137.31
	Jaithari	6924.66	75.58	628.01	197.98	7826.23	782.62	7043.61
	Kotma	4417.49	27.31	314.32	63.73	4822.85	241.14	4581.71
	Pushparajgarh	7848.27	67.8	649.83	98.42	8664.32	433.21	8231.11
	<b>DISTRICT TOTAL</b>	<b>26118.32</b>	<b>200.17</b>	<b>2107.1</b>	<b>400.77</b>	<b>28826.36</b>	<b>1832.62</b>	<b>26993.74</b>
<b>4</b>	<b>ASHOKNAGAR</b>							
	Ashoknagar	8393.61	460.92	0	1668.98	10523.51	526.18	9997.33

S.N.	Assessment Unit	Recharge from Rainfall-Monsoon Season (Ham)	Recharge from Other Sources-Monsoon Season (Ham)	Recharge from Rainfall-Non Monsoon Season (Ham)	Recharge from Other Sources- Non Monsoon Season (Ham)	Total Annual Ground Water Recharge (Ham)	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)
	Chanderi	5356.25	360.15	0	1294.58	7010.98	385.2	6625.78
	Isagarh	7603.39	399.05	0	1351.38	9353.82	935.38	8418.44
	Mungaoli	7875.24	976.68	0	3752.82	12604.74	821.95	11782.79
	<b>DISTRICT TOTAL</b>	<b>29228.49</b>	<b>2196.8</b>	<b>0</b>	<b>8067.76</b>	<b>39493.05</b>	<b>2668.71</b>	<b>36824.34</b>
<b>5</b>	<b>BALAGHAT</b>							
	Baihar	9096.89	113.86	32.35	118.75	9361.85	936.19	8425.66
	Balaghat	9103.18	748.02	31.1	467.07	10349.37	932.31	9417.06
	Birsa	10324.78	130.34	34.7	105.75	10595.57	529.78	10065.79
	Katangi	4856.9	599.74	17.15	557.56	6031.35	548.69	5482.66
	Khairlanji	3662.37	349.28	11.22	375.65	4398.52	219.92	4178.6
	Kirnapur	6297.89	273.48	19.35	336.17	6926.89	346.35	6580.54
	Lalbarra	5956.02	843.16	17.12	464.14	7280.44	467.04	6813.4
	Lanji	8453.79	360.51	20.96	298.91	9134.17	570.87	8563.3
	Paraswada	8677.99	125.99	29.64	81.94	8915.56	445.78	8469.78
	Waraseoni	3380.93	416.06	10.61	352.67	4160.27	208.01	3952.25
	<b>DISTRICT TOTAL</b>	<b>69810.74</b>	<b>3960.44</b>	<b>224.2</b>	<b>3158.61</b>	<b>77153.99</b>	<b>5204.94</b>	<b>71949.04</b>
<b>6</b>	<b>BARWANI</b>							
	Barwani	4820.51	367.76	0	1749.17	6937.44	581.55	6355.89
	Niwali	3048.15	195.86	0	619.34	3863.35	193.18	3670.17
	Pansemal	3730.36	629.84	0	2379.64	6739.84	623.9	6115.94
	Pati	2042.24	251.85	0	514.23	2808.32	270.88	2537.44
	Rajpur	5952.64	1063.53	0	3774.07	10790.24	539.51	10250.73
	Sendhwa	6770.42	616.46	0	1928.51	9315.39	465.78	8849.61

S.N.	Assessment Unit	Recharge from Rainfall-Monsoon Season (Ham)	Recharge from Other Sources-Monsoon Season (Ham)	Recharge from Rainfall-Non Monsoon Season (Ham)	Recharge from Other Sources- Non Monsoon Season (Ham)	Total Annual Ground Water Recharge (Ham)	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)
	Thikri	6379.09	580.95	0	8427.16	15387.2	1130.8	14256.4
	<b>DISTRICT TOTAL</b>	<b>32743.41</b>	<b>3706.25</b>	<b>0</b>	<b>19392.12</b>	<b>55841.78</b>	<b>3805.6</b>	<b>52036.18</b>
<b>7</b>	<b>BETUL</b>							
	Amla	11865.17	509.48	286.29	2248.76	14909.7	745.48	14164.22
	Athner	4986.76	237.38	157.77	867.69	6249.6	331.51	5918.09
	Betul	10434.37	768.91	283.26	2691.06	14177.6	708.88	13468.72
	Bhainsdehi	8934.8	310.5	301.93	1299.25	10846.48	1084.65	9761.83
	Bhimpur	8721.15	215.76	286.08	648.55	9871.54	493.58	9377.96
	Chicholi	4598.36	155.49	104.52	712.09	5570.46	540.37	5030.09
	Ghoda Dongri	13498.02	241.91	305.39	1006.77	15052.09	1505.2	13546.89
	Multai	9170.86	770.03	257.83	2519.73	12718.45	688.54	12029.91
	Prabhat Pattan	9344.92	306.02	315.55	928.55	10895.04	589.43	10305.61
	Shahpur	3536.18	192.38	119.5	759.7	4607.76	460.77	4146.99
	<b>DISTRICT TOTAL</b>	<b>85090.59</b>	<b>3707.86</b>	<b>2418.12</b>	<b>13682.15</b>	<b>104898.72</b>	<b>7148.41</b>	<b>97750.31</b>
<b>8</b>	<b>BHIND</b>							
	Ater	13274.43	223.45	0	2033.95	15531.83	1553.18	13978.65
	Bhind	11447.87	235.31	0	2518.43	14201.61	1120.88	13080.73
	Gohad	18314.5	456.09	0	3218.86	21989.45	1549.25	20440.2
	Lahar	10310.59	153.24	0	2044.28	12508.11	910	11598.11
	Mehgaon	19852.69	549.59	0	3599.8	24002.08	1972.6	22029.48
	Ron	9370.18	62.31	0	374.65	9807.14	980.72	8826.42
	<b>DISTRICT TOTAL</b>	<b>82570.26</b>	<b>1679.99</b>	<b>0</b>	<b>13789.97</b>	<b>98040.22</b>	<b>8086.63</b>	<b>89953.59</b>
<b>9</b>	<b>BHOPAL</b>							

S.N.	Assessment Unit	Recharge from Rainfall-Monsoon Season (Ham)	Recharge from Other Sources-Monsoon Season (Ham)	Recharge from Rainfall-Non Monsoon Season (Ham)	Recharge from Other Sources- Non Monsoon Season (Ham)	Total Annual Ground Water Recharge (Ham)	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)
	Berasia	16331.01	915.03	0	2954.82	20200.86	1010.04	19190.82
	Bhopal Urban	3594.13	600.69	0	1071.53	5266.35	263.32	5003.03
	Phanda	11752.07	926.21	0	2604.94	15283.22	1528.32	13754.9
	<b>DISTRICT TOTAL</b>	<b>31677.21</b>	<b>2441.93</b>	<b>0</b>	<b>6631.29</b>	<b>40750.43</b>	<b>2801.68</b>	<b>37948.75</b>
<b>10</b>	<b>BURHANPUR</b>							
	Burhanpur	15035.9	946.54	131.36	3165.2	19279	1848.44	17430.56
	Khaknar	12808.16	1039.5	133.27	3421.48	17402.41	870.12	16532.29
	<b>DISTRICT TOTAL</b>	<b>27844.06</b>	<b>1986.04</b>	<b>264.63</b>	<b>6586.68</b>	<b>36681.41</b>	<b>2718.56</b>	<b>33962.85</b>
<b>11</b>	<b>CHHATARPUR</b>							
	Bada Malhera	9507.28	643.54	0	2979.57	13130.39	796.93	12333.46
	Bijawar	10859.1	679.44	0	1810.42	13348.96	674.68	12674.28
	Buxwaha	5360.49	451.66	0	1331.67	7143.82	714.39	6429.43
	Chhatarpur	7170.33	663.98	0	2214.3	10048.61	502.43	9546.18
	Gaurihar	6228.04	192.32	0	1161.3	7581.66	379.08	7202.58
	Laundi	5484.84	608.23	0	2551.17	8644.24	568.8	8075.44
	Nowgaon	5870.81	1021.97	0	2328.18	9220.96	461.05	8759.91
	Rajnagar	14196.04	781.78	0	2664.93	17642.75	1764.27	15878.48
	<b>DISTRICT TOTAL</b>	<b>64676.93</b>	<b>5042.92</b>	<b>0</b>	<b>17041.54</b>	<b>86761.39</b>	<b>5861.63</b>	<b>80899.76</b>
<b>12</b>	<b>CHHINDWARA</b>							
	Amarwara	8847.2	374.44	72.98	1243.96	10538.58	1053.85	9484.73
	Bichhua	5452.61	171.11	32.15	651.84	6307.71	315.39	5992.32
	Chaurai	10732.18	385.08	88.53	1479.75	12685.54	1268.56	11416.98
	Chhindwara	8000.32	575.52	47.06	1816.95	10439.85	521.99	9917.86

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	Harra	7609.17	167.47	53.22	588.47	8418.33	420.91	7997.42
	Jamai	11036.22	173.95	71.88	724.95	12007	600.35	11406.65
	Mohkheda	7511.26	855.65	52.75	2661.18	11080.84	668.98	10411.86
	Pandhurna	8751.69	678.69	67.72	1802.99	11301.09	565.06	10736.03
	Parasia	7499.09	246.75	41.24	806	8593.08	859.3	7733.78
	Sausar	6462.48	439.37	37.1	1351.08	8290.03	414.49	7875.54
	Tamia	4810.8	99.02	39.68	197.19	5146.69	514.67	4632.02
	<b>DISTRICT TOTAL</b>	<b>86713.02</b>	<b>4167.05</b>	<b>604.31</b>	<b>13324.36</b>	<b>104808.74</b>	<b>7203.55</b>	<b>97605.19</b>
<b>13</b>	<b>DAMOH</b>							
	Batiyagarh	6238.18	335.29	0	1122.96	7696.43	415.9	7280.53
	Damoh	6378.77	360.15	0	1477.98	8216.9	725.19	7491.71
	Hatta	2132.49	353.86	0	700.76	3187.11	197.93	2989.18
	Jabera	2772.92	407.36	0	2985.27	6165.55	472.8	5692.75
	Patera	3169.35	227.57	0	739.76	4136.68	383.11	3753.57
	Patharia	4780.82	272.58	0	958.05	6011.45	300.58	5710.87
	Tendulheda	2504.78	222.5	0	1237.38	3964.66	307.1	3657.56
	<b>DISTRICT TOTAL</b>	<b>27977.31</b>	<b>2179.31</b>	<b>0</b>	<b>9222.16</b>	<b>39378.78</b>	<b>2802.61</b>	<b>36576.17</b>
<b>14</b>	<b>DATIA</b>							
	Bhander	10996.97	256.8	0	2810.59	14064.36	954.45	13109.91
	Datia	5368.02	257.77	0	1555.42	7181.21	359.06	6822.15
	Seondha	18557.83	394.18	0	2878.28	21830.29	1640.03	20190.26
	<b>DISTRICT TOTAL</b>	<b>34922.82</b>	<b>908.75</b>	<b>0</b>	<b>7244.29</b>	<b>43075.86</b>	<b>2953.54</b>	<b>40122.32</b>
<b>15</b>	<b>DEWAS</b>							

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	Bagli	17599.75	930.41	0	3039.92	21570.08	1102.86	20467.22
	Dewas	11871.73	990.45	0	3489.72	16351.9	817.6	15534.3
	Kannod	10103.27	710.38	0	2764.33	13577.98	813.74	12764.24
	Khategaon	10009.47	660.51	0	2010.99	12680.97	634.05	12046.92
	Sonkutch	7951.51	659.87	0	2182.86	10794.24	1079.43	9714.81
	Tonkkhurd	8541.17	1064.48	0	1968.9	11574.55	1157.46	10417.09
	<b>DISTRICT TOTAL</b>	<b>66076.9</b>	<b>5016.1</b>	<b>0</b>	<b>15456.72</b>	<b>86549.72</b>	<b>5605.14</b>	<b>80944.58</b>
<b>16</b>	<b>DHAR</b>							
	Badnawar	11986.02	948.2	0	4609.08	17543.3	1698.38	15844.92
	Bagh	5129.36	179.23	0	1312.48	6621.07	331.06	6290.01
	Dahi	5577.2	344.67	0	3597.03	9518.9	776.35	8742.55
	Dhar	7002.74	733.53	0	2935.31	10671.58	1067.16	9604.42
	Dharmपुर	3484.81	307.7	0	4280.45	8072.96	726.01	7346.95
	Gandhwani	6627.76	435.43	0	6027.6	13090.79	654.54	12436.25
	Kukshi	3701.42	155.08	0	1605.49	5461.99	273.1	5188.89
	Manawar	4947.18	410.61	0	4919.18	10276.97	513.85	9763.12
	Nalchha	9094.52	778.56	0	2601.12	12474.2	1233.42	11240.78
	Nisarpur	3570.39	245.86	0	2969.77	6786.02	339.29	6446.72
	Sardarpur	14305.38	1193.59	0	4582.4	20081.37	1744.55	18336.82
	Tirla	6211.73	817.16	0	1830.84	8859.73	885.97	7973.76
	Umarvan	4707.58	399.29	0	3894.69	9001.56	450.08	8551.48
	<b>DISTRICT TOTAL</b>	<b>86346.09</b>	<b>6948.91</b>	<b>0</b>	<b>45165.44</b>	<b>138460.44</b>	<b>10693.76</b>	<b>127766.67</b>
<b>17</b>	<b>DINDORI</b>							

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	Amarpur	3443.56	30.43	28.32	54.88	3557.19	177.86	3379.33
	Bajang	3189.21	26.44	27.56	46.17	3289.38	164.47	3124.91
	Dindori	6348.89	38.03	59.52	87.17	6533.61	326.68	6206.93
	Karanjiya	4726.19	38.63	35.7	75.97	4876.49	243.82	4632.67
	Menhadwani	4407.55	30.09	33.37	63.89	4534.9	226.74	4308.16
	Samnapur	4363.74	53.05	33.07	104.22	4554.08	227.7	4326.38
	Shahpura	7334.31	61.05	70.69	196.5	7662.55	383.13	7279.42
	<b>DISTRICT TOTAL</b>	<b>33813.45</b>	<b>277.72</b>	<b>288.23</b>	<b>628.8</b>	<b>35008.2</b>	<b>1750.4</b>	<b>33257.8</b>
<b>18</b>	<b>GUNA</b>							
	Aron	9844.23	416.21	0	1501.14	11761.58	588.08	11173.5
	Bamori	11880	1275.9	0	3639.19	16795.09	839.76	15955.33
	Chachaura	15243.57	731.06	0	2741.63	18716.26	935.82	17780.44
	Guna	12725.18	807.5	0	2289.33	15822.01	844.24	14977.77
	Raghogarh	12797.51	1109.5	0	4679.76	18586.77	1159.22	17427.55
	<b>DISTRICT TOTAL</b>	<b>62490.49</b>	<b>4340.17</b>	<b>0</b>	<b>14851.05</b>	<b>81681.71</b>	<b>4367.12</b>	<b>77314.59</b>
<b>19</b>	<b>GWALIOR</b>							
	Bhitarwar	14663.32	3450.16	0	7414.88	25528.36	1601.74	23926.62
	Dabra	11964.72	3290.76	0	6796.62	22052.1	1402.98	20649.12
	Ghatigaon	13166.06	461.4	0	2105.92	15733.38	1573.33	14160.05
	Gwalior Urban	4872.58	215.19	0	394.34	5482.11	548.21	4933.9
	Morar	11526.34	459.95	0	1462.63	13448.92	1344.89	12104.03
	<b>DISTRICT TOTAL</b>	<b>56193.02</b>	<b>7877.46</b>	<b>0</b>	<b>18174.39</b>	<b>82244.87</b>	<b>6471.15</b>	<b>75773.72</b>
<b>20</b>	<b>HARDA</b>							

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	Harda	11210.58	467.97	0	1550.68	13229.23	1322.92	11906.3
	Khirkiya	5991.15	110.38	0	858.82	6960.35	348.02	6612.33
	Timarni	10980	2337.77	0	13449.57	26767.34	1338.37	25428.97
	<b>DISTRICT TOTAL</b>	<b>28181.73</b>	<b>2916.12</b>	<b>0</b>	<b>15859.07</b>	<b>46956.92</b>	<b>3009.31</b>	<b>43947.6</b>
<b>21</b>	<b>HOSHANGABAD</b>							
	Babai	25728.24	904.71	0	5920.16	32553.11	3255.3	29297.81
	Bankhedhi	15606.84	532.05	0	3134.86	19273.75	963.68	18310.07
	Hoshangabad	16556.07	2201.06	0	11264.83	30021.96	3002.19	27019.75
	Kesala	11268.51	1058.82	0	5768.29	18095.62	904.79	17190.83
	Pipariya	20061.78	481.09	0	1938.53	22481.4	2018.49	20462.91
	Seoni Malwa	32671.54	1832.64	0	10438.26	44942.44	4494.24	40448.2
	Shohagpur	8562.76	559.92	0	2782.7	11905.38	938.59	10966.79
	<b>DISTRICT TOTAL</b>	<b>130455.74</b>	<b>7570.29</b>	<b>0</b>	<b>41247.63</b>	<b>179273.66</b>	<b>15577.28</b>	<b>163696.36</b>
<b>22</b>	<b>INDORE</b>							
	Depalpur	12384.46	1678.99	0	4730.68	18794.13	1879.42	16914.71
	Indore	6148.64	763.55	0	2157.22	9069.41	906.94	8162.47
	Indore Urban	4938.44	586.67	0	1030.66	6555.77	655.58	5900.19
	Mhow	8769.46	674.32	0	1801.32	11245.1	562.26	10682.84
	Sawer	9382.6	813.58	0	2888.43	13084.61	1308.46	11776.15
	<b>DISTRICT TOTAL</b>	<b>41623.6</b>	<b>4517.11</b>	<b>0</b>	<b>12608.31</b>	<b>58749.02</b>	<b>5312.66</b>	<b>53436.36</b>
<b>23</b>	<b>JABALPUR</b>							
	Bargi	4356.26	202.53	0	687.93	5246.72	524.67	4722.05
	Jabalpur Urban	2977.45	196.3	0	384.73	3558.48	355.85	3202.63

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	Kundam	4183.18	177.01	0	329.11	4689.3	234.47	4454.83
	Majholi	7797.48	219.29	0	680.51	8697.28	869.73	7827.55
	Panagar	7189.8	534.5	0	1061.09	8785.39	772.57	8012.82
	Patan	12127.79	989.46	0	2939.38	16056.63	1232.89	14823.74
	Shahpura	8620.06	526.8	0	1400.09	10546.95	527.34	10019.61
	Sihora	7476.51	359.48	0	1312.46	9148.45	914.85	8233.6
	<b>DISTRICT TOTAL</b>	<b>54728.53</b>	<b>3205.37</b>	<b>0</b>	<b>8795.3</b>	<b>66729.2</b>	<b>5432.37</b>	<b>61296.83</b>
<b>24</b>	<b>JHABUA</b>							
	Jhabua	1750.9	160.42	0	362.32	2273.64	227.36	2046.28
	Meghnagar	2961.91	155	0	351.58	3468.49	346.85	3121.64
	Petlawad	8108.46	440.06	0	2988.24	11536.76	788.42	10748.34
	Rama	2163.78	178.64	0	366.74	2709.16	135.46	2573.7
	Ranapur	1790.99	110.44	0	225.22	2126.65	106.33	2020.32
	Thandla	3376.32	186.19	0	406.13	3968.64	198.44	3770.2
	<b>DISTRICT TOTAL</b>	<b>20152.36</b>	<b>1230.75</b>	<b>0</b>	<b>4700.23</b>	<b>26083.34</b>	<b>1802.86</b>	<b>24280.48</b>
<b>25</b>	<b>KATNI</b>							
	Badwara	6792.09	537.12	0	1402.43	8731.64	436.58	8295.06
	Bahoriband	7784.55	397.27	0	1078.14	9259.96	926	8333.96
	Dhimar Kheda	4892.13	165.65	0	337.2	5394.98	269.75	5125.23
	Murwara	5871.68	424.02	0	1009.22	7304.92	437.49	6867.43
	Rithi	3381.18	154.76	0	404.03	3939.97	197	3742.97
	Vijayraghvarh	5625.97	148.5	0	519.47	6293.94	629.4	5664.54
	<b>DISTRICT TOTAL</b>	<b>34347.6</b>	<b>1827.32</b>	<b>0</b>	<b>4750.49</b>	<b>40925.41</b>	<b>2896.22</b>	<b>38029.19</b>

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<b>26</b>	<b>KHANDWA</b>							
	Baldi	5489.41	198.53	0	760.95	6448.89	322.45	6126.44
	Chhegaon Makhan	10147.47	542.16	0	2511.87	13201.5	1320.16	11881.34
	Harsud	4516.63	254.9	0	690.81	5462.34	273.12	5189.22
	Khalwa	9773.89	458.57	0	1405.09	11637.55	581.87	11055.68
	Khandwa	8262.24	466.88	0	1695.33	10424.45	521.23	9903.22
	Pandhana	11507.61	745.35	0	5030.78	17283.74	864.18	16419.55
	Punasa	7252.28	1586.2	0	40595.42	49433.9	4813.1	44620.8
	<b>DISTRICT TOTAL</b>	<b>56949.53</b>	<b>4252.59</b>	<b>0</b>	<b>52690.25</b>	<b>113892.37</b>	<b>8696.11</b>	<b>105196.25</b>
<b>27</b>	<b>KHARGONE</b>							
	Barwaha	10231.04	900.14	0	9899.58	21030.76	1051.54	19979.22
	Bhagwanpura	3983.88	877.45	0	2400.04	7261.37	476.1	6785.27
	Bhikangaon	8220.37	679.36	0	3629.61	12529.34	626.47	11902.87
	Gogawan	3690.34	246.8	0	1598.36	5535.5	276.76	5258.74
	Jhiranya	5432.77	1043.26	0	2470.4	8946.43	533.61	8412.82
	Kasrawad	8018.42	1106.63	0	9255.17	18380.22	919.01	17461.21
	Khargone	4095.85	406.62	0	1459.33	5961.8	298.1	5663.7
	Maheshwar	6820.29	588.54	0	4843.21	12252.04	612.6	11639.44
	Segaon	3763.03	414.93	0	1427.12	5605.08	560.51	5044.57
	<b>DISTRICT TOTAL</b>	<b>54255.99</b>	<b>6263.73</b>	<b>0</b>	<b>36982.82</b>	<b>97502.54</b>	<b>5354.7</b>	<b>92147.84</b>
<b>28</b>	<b>MANDLA</b>							
	Bichhiya	6869.04	198.31	132.5	1022.31	8222.16	411.11	7811.05
	Bijadandi	3986.83	28.94	91.75	64.28	4171.8	208.59	3963.21

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	Ghughari	6149.57	51.86	132.75	91.95	6426.13	321.3	6104.83
	Mandla	3654.87	173.44	74.39	687.5	4590.2	229.5	4360.7
	Mawai	8908.46	78.06	176.39	219.49	9382.4	469.12	8913.28
	Mohgaon	2184.32	83.56	49.4	243.79	2561.07	128.05	2433.02
	Nainpur	5263.37	249.53	96.23	1417.66	7026.79	351.34	6675.45
	Narayanganj	2625.56	114.96	53.05	234.4	3027.97	151.4	2876.57
	Niwas	3488.29	81.27	58.6	197.44	3825.6	191.28	3634.32
	<b>DISTRICT TOTAL</b>	<b>43130.31</b>	<b>1059.93</b>	<b>865.06</b>	<b>4178.82</b>	<b>49234.12</b>	<b>2461.69</b>	<b>46772.43</b>
<b>29</b>	<b>MANDSAUR</b>							
	Bhanpura	4572.41	823.18	0	2175.61	7571.2	598.67	6972.53
	Garoth	10826.04	1408.24	0	3289.72	15524	1552.39	13971.61
	Malhargarh	7582.49	1404.3	0	2652.74	11639.53	1046.79	10592.74
	Mandsaur	12039.29	1098.74	0	3811.23	16949.26	1694.92	15254.34
	Sitamau	12076.17	1190.37	0	4944.86	18211.4	1821.14	16390.26
	<b>DISTRICT TOTAL</b>	<b>47096.4</b>	<b>5924.83</b>	<b>0</b>	<b>16874.16</b>	<b>69895.39</b>	<b>6713.91</b>	<b>63181.48</b>
<b>30</b>	<b>MORENA</b>							
	Ambah	5519.37	138.67	0	1908.27	7566.31	756.63	6809.68
	Jaora	7640.35	210.76	0	2919.66	10770.77	538.54	10232.23
	Kailaras	6413.06	283.09	0	1860.23	8556.38	566.13	7990.25
	Morena	10225.32	351.68	0	2366.14	12943.14	647.16	12295.98
	Pahadgarh	6975.5	190.16	0	2415.63	9581.29	958.13	8623.16
	Porsa	4936.11	68.98	0	1403.18	6408.27	640.83	5767.44
	Sabargarh	8474.16	326.15	0	5184.84	13985.15	1088.35	12896.8

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	<b>DISTRICT TOTAL</b>	<b>50183.87</b>	<b>1569.49</b>	<b>0</b>	<b>18057.95</b>	<b>69811.31</b>	<b>5195.77</b>	<b>64615.54</b>
<b>31</b>	<b>NARSINGHPUR</b>							
	Chawarpatha	21716.54	495.05	0	1660.42	23872.01	2387.2	21484.81
	Chichli	16965.83	412.29	0	2172.45	19550.57	1955.06	17595.51
	Gotegaon	17529.39	682.74	0	3155.08	21367.21	1829.26	19537.95
	Kareli	18637.71	752.24	0	2935.03	22324.98	2232.51	20092.47
	Narsinghpur	18271.89	610.01	0	4348.93	23230.83	2082.9	21147.93
	Saikheda	11630.26	249.2	0	1703.34	13582.8	679.14	12903.66
	<b>DISTRICT TOTAL</b>	<b>104751.62</b>	<b>3201.53</b>	<b>0</b>	<b>15975.25</b>	<b>123928.4</b>	<b>11166.07</b>	<b>112762.33</b>
<b>32</b>	<b>NEEMUCH</b>							
	Jawad	8408.4	809.8	0	2872.12	12090.32	1209.03	10881.29
	Manasa	9248.88	878.5	0	2430.12	12557.5	1255.75	11301.75
	Neemuch	11261.27	1103.82	0	3152.23	15517.32	1551.73	13965.59
	<b>DISTRICT TOTAL</b>	<b>28918.55</b>	<b>2792.12</b>	<b>0</b>	<b>8454.47</b>	<b>40165.14</b>	<b>4016.51</b>	<b>36148.63</b>
<b>33</b>	<b>NIWARI</b>							
	Niwari	5054.65	503.64	0	1708.76	7267.05	363.36	6903.69
	Prithvipur	9404.85	789.06	0	2182.71	12376.62	1160.19	11216.42
	<b>DISTRICT TOTAL</b>	<b>14459.5</b>	<b>1292.7</b>	<b>0</b>	<b>3891.47</b>	<b>19643.67</b>	<b>1523.55</b>	<b>18120.11</b>
<b>34</b>	<b>PANNA</b>							
	Ajaigarh	16123.22	400.07	0	1773.07	18296.36	1829.64	16466.72
	Gunnor	5155.76	288.75	0	886.28	6330.79	596.93	5733.86
	Panna	11089.78	234.1	0	1171.55	12495.43	698.28	11797.15
	Pawai	8821.3	285.89	0	1267.43	10374.62	518.74	9855.88

S.N.	Assessment Unit	Recharge from Rainfall-Monsoon Season (Ham)	Recharge from Other Sources-Monsoon Season (Ham)	Recharge from Rainfall-Non Monsoon Season (Ham)	Recharge from Other Sources- Non Monsoon Season (Ham)	Total Annual Ground Water Recharge (Ham)	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)
	Shahnagar	5840.09	215.86	0	1108.38	7164.33	416.45	6747.88
	<b>DISTRICT TOTAL</b>	<b>47030.15</b>	<b>1424.67</b>	<b>0</b>	<b>6206.71</b>	<b>54661.53</b>	<b>4060.04</b>	<b>50601.49</b>
<b>35</b>	<b>RAISEN</b>							
	Badi	21930.92	1044.21	0	1834.11	24809.24	2108.31	22700.93
	Begamganj	9118.91	353.65	0	1205.47	10678.03	533.9	10144.13
	Gairatganj	7495.08	327.25	0	1044.25	8866.58	886.66	7979.92
	Obedullaganj	7447.64	547.77	0	1676.01	9671.42	483.57	9187.85
	Sanchi	11878.07	449.72	0	1567.95	13895.74	694.79	13200.95
	Silwani	11241.09	462.51	0	1715.19	13418.79	670.94	12747.85
	Udaipura	10363.89	360.88	0	1333.33	12058.1	1205.81	10852.29
	<b>DISTRICT TOTAL</b>	<b>79475.6</b>	<b>3545.99</b>	<b>0</b>	<b>10376.31</b>	<b>93397.9</b>	<b>6583.98</b>	<b>86813.92</b>
<b>36</b>	<b>RAJGARH</b>							
	Biaora	13990.01	879.77	0	3061.34	17931.12	896.56	17034.56
	Jirapur	10379.43	561.65	0	1932.63	12873.71	643.68	12230.03
	Khilchipur	9039.72	519.18	0	2082.2	11641.1	582.05	11059.05
	Narsingharh	13283.22	1026.19	0	3305.03	17614.44	880.72	16733.72
	Rajgarh	13668.69	779.63	0	2437.22	16885.54	844.28	16041.26
	Sarangpur	11253.46	784.09	0	2879.78	14917.33	1491.73	13425.6
	<b>DISTRICT TOTAL</b>	<b>71614.53</b>	<b>4550.51</b>	<b>0</b>	<b>15698.2</b>	<b>91863.24</b>	<b>5339.02</b>	<b>86524.22</b>
<b>37</b>	<b>RATLAM</b>							
	Alot	12135.84	1064.33	0	3684.08	16884.25	1688.43	15195.82
	Bajna	3610.06	910.89	0	2183.66	6704.61	578.55	6126.06
	Jaora	9798.56	1429.23	0	5282.68	16510.47	1651.05	14859.42

S.N.	Assessment Unit	Recharge from Rainfall-Monsoon Season (Ham)	Recharge from Other Sources-Monsoon Season (Ham)	Recharge from Rainfall-Non Monsoon Season (Ham)	Recharge from Other Sources- Non Monsoon Season (Ham)	Total Annual Ground Water Recharge (Ham)	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)
	Piploda	7756.66	1036.16	0	3848.99	12641.81	1264.18	11377.63
	Ratlam	17092.91	2451.47	0	6811.1	26355.48	2635.55	23719.93
	Sailana	4313.33	479.61	0	1126.86	5919.8	295.99	5623.81
	<b>DISTRICT TOTAL</b>	<b>54707.36</b>	<b>7371.69</b>	<b>0</b>	<b>22937.37</b>	<b>85016.42</b>	<b>8113.75</b>	<b>76902.67</b>
<b>38</b>	<b>REWA</b>							
	Gangev	3281.98	229.15	21.43	971.16	4503.72	377.02	4126.7
	Hanumana	6890.87	131.68	40.56	347.17	7410.28	741.03	6669.25
	Jawa	7929.19	129.91	46.67	513.6	8619.37	861.94	7757.43
	Mauganj	3406.97	141.34	20.05	546.07	4114.43	411.44	3702.99
	Naigarhi	2360.01	69.52	13.89	337.64	2781.06	278.1	2502.96
	Rampur Karchuliyan	3142.71	358.34	20.86	1506.23	5028.14	354.38	4673.76
	Rewa	3956.49	343.55	27.06	1383.37	5710.47	285.53	5424.94
	Sirmour	4146.38	414.03	34.86	981	5576.27	367.83	5208.44
	Teonthar	9851.71	190.15	57.99	738.48	10838.33	1083.84	9754.49
	<b>DISTRICT TOTAL</b>	<b>44966.31</b>	<b>2007.67</b>	<b>283.37</b>	<b>7324.72</b>	<b>54582.07</b>	<b>4761.11</b>	<b>49820.96</b>
<b>39</b>	<b>SAGAR</b>							
	Banda	9598.27	455.78	0	1274.98	11329.03	1105.78	10223.25
	Bina	10599.52	319.82	0	1683.43	12602.77	630.14	11972.63
	Deori	7551.4	387.18	0	1390.41	9328.99	932.91	8396.08
	Jaisinagar	8874.65	426.15	0	1326.77	10627.57	531.38	10096.19
	Kesli	8466.17	494.9	0	1491.15	10452.22	522.61	9929.61
	Khurai	8428.8	268.08	0	981.56	9678.44	967.85	8710.59
	Malthon	6837.49	176.91	0	725.26	7739.66	773.96	6965.7

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	Rahatgarh	8268.49	310.25	0	1116.24	9694.98	484.75	9210.23
	Rehli	5888.41	342.44	0	936.1	7166.95	358.34	6808.61
	Sagar	13508.74	363.31	0	1670.1	15542.15	1554.21	13987.94
	Shahnagar	4412.7	349.41	0	1874.03	6636.14	565.63	6070.51
	<b>DISTRICT TOTAL</b>	<b>92434.64</b>	<b>3894.23</b>	<b>0</b>	<b>14470.03</b>	<b>110798.9</b>	<b>8427.56</b>	<b>102371.34</b>
<b>40</b>	<b>SATNA</b>							
	Amarpatan	5698.97	404.94	101.72	2403.05	8608.68	788.65	7820.03
	Maiihar	5758.88	176.16	129.63	862.07	6926.74	346.34	6580.4
	Majhgawan	11453.08	306.8	277.62	907.16	12944.66	647.23	12297.43
	Nagod	8216.28	514.66	158.93	2682.18	11572.05	578.61	10993.44
	Ramnagar	5629.93	100.06	99.39	415.75	6245.13	624.51	5620.62
	Rampur-Baghelan	5630.26	446.67	114.99	3197.93	9389.85	938.98	8450.87
	Sohawal	7798.47	506.78	143.89	1871.48	10320.62	1032.05	9288.56
	Unchehara	5913.59	235.43	125.56	2188.26	8462.84	495.92	7966.92
	<b>DISTRICT TOTAL</b>	<b>56099.46</b>	<b>2691.5</b>	<b>1151.73</b>	<b>14527.88</b>	<b>74470.57</b>	<b>5452.29</b>	<b>69018.27</b>
<b>41</b>	<b>SEHORE</b>							
	Ashta	10748.41	931.59	0	2969.36	14649.36	1464.94	13184.42
	Budni	6864.69	457.39	0	4045.14	11367.22	967.48	10399.74
	Ichhawar	6504.88	426.91	0	1221.08	8152.87	483.97	7668.9
	Nasrullaganj	10391.02	786.2	0	3043.44	14220.66	999.18	13221.48
	Sehore	21089.77	1221.07	0	3266.99	25577.83	2557.78	23020.05
	<b>DISTRICT TOTAL</b>	<b>55598.77</b>	<b>3823.16</b>	<b>0</b>	<b>14546.01</b>	<b>73967.94</b>	<b>6473.35</b>	<b>67494.59</b>
<b>42</b>	<b>SEONI</b>							

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	Barghat	5457.94	272	196.29	1025.55	6951.78	404.78	6547
	Chhapara	5193.44	330.48	179.46	808.67	6512.05	325.61	6186.44
	Dhanora	4156.19	107.9	172.82	343.86	4780.77	239.04	4541.73
	Ghansaur	6430.76	119.03	237.78	270.2	7057.77	352.89	6704.88
	Keolari	5991.97	229.59	219.28	661.32	7102.16	602.2	6499.96
	Kurai	13047.56	203.02	473.83	678.57	14402.98	720.15	13682.83
	Lakhnadon	12913.64	324.69	438.38	942.09	14618.8	730.94	13887.86
	Seoni	8127.58	642.36	366.64	1865.61	11002.19	659.37	10342.82
	<b>DISTRICT TOTAL</b>	<b>61319.08</b>	<b>2229.07</b>	<b>2284.48</b>	<b>6595.87</b>	<b>72428.5</b>	<b>4034.98</b>	<b>68393.52</b>
<b>43</b>	<b>SHAHDOL</b>							
	Beohari	5745.96	140.43	139.82	640.69	6666.9	333.33	6333.57
	Burhar	13468.21	29.28	329.65	54.74	13881.88	694.09	13187.79
	Gohparu	10068.83	21.51	239.7	50.5	10380.54	519.03	9861.51
	Jaisinghnagar	15741.94	85.63	402.16	245.96	16475.69	823.79	15651.9
	Sohagpur	8178.8	50.75	194.2	142.03	8565.78	428.29	8137.49
	<b>DISTRICT TOTAL</b>	<b>53203.74</b>	<b>327.6</b>	<b>1305.53</b>	<b>1133.92</b>	<b>55970.79</b>	<b>2798.53</b>	<b>53172.26</b>
<b>44</b>	<b>SHAJAPUR</b>							
	Kalapipal	10950.83	825.01	0	2949.35	14725.19	1472.52	13252.67
	Moman Badodiya	9606.26	907.29	0	3352.7	13866.25	693.31	13172.94
	Shajapur	9926.2	743.52	0	2155.46	12825.18	641.26	12183.92
	Shujalpur	10818.2	862.76	0	2606.47	14287.43	1428.75	12858.68
	<b>DISTRICT TOTAL</b>	<b>41301.49</b>	<b>3338.58</b>	<b>0</b>	<b>11063.98</b>	<b>55704.05</b>	<b>4235.84</b>	<b>51468.21</b>
<b>45</b>	<b>SHEOPUR</b>							

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	Karahal	11707.98	429.92	0	1433.78	13571.68	1357.17	12214.51
	Sheopur	16240.76	264.33	0	15744.66	32249.75	3224.98	29024.77
	Vijaypur	7418.31	395.6	0	2196.18	10010.09	574.8	9435.29
	<b>DISTRICT TOTAL</b>	<b>35367.05</b>	<b>1089.85</b>	<b>0</b>	<b>19374.62</b>	<b>55831.52</b>	<b>5156.95</b>	<b>50674.57</b>
<b>46</b>	<b>SHIVPURI</b>							
	Badarwas	9577.09	686.78	0	2230.26	12494.13	1202.58	11291.55
	Karera	6015.72	351.06	0	1623.27	7990.05	399.5	7590.55
	Khaniyadhana	7482.45	646.3	0	2129.06	10257.81	1025.79	9232.02
	Kolaras	9044.91	378.74	0	1472.03	10895.68	1089.57	9806.11
	Narwar	6511.48	534.51	0	2353.05	9399.04	939.91	8459.14
	Pichhore	5230.32	419.26	0	2046.76	7696.34	384.81	7311.53
	Pohari	12172.51	391.53	0	1533.88	14097.92	1409.79	12688.13
	Shivpuri	10507.39	430.44	0	1658.98	12596.81	655.88	11940.93
	<b>DISTRICT TOTAL</b>	<b>66541.87</b>	<b>3838.62</b>	<b>0</b>	<b>15047.29</b>	<b>85427.78</b>	<b>7107.83</b>	<b>78319.96</b>
<b>47</b>	<b>SIDHI</b>							
	Kusmi	7776.26	114.94	115.54	394.86	8401.6	420.08	7981.52
	Majholi	5578.06	110.9	69.67	350.99	6109.62	610.97	5498.65
	Rampur Naikin	6056.65	202.03	90.25	889.2	7238.13	361.91	6876.22
	Sidhi	3654.37	221.76	57.36	607.09	4540.58	256.49	4284.09
	Sihawal	4275.55	149.64	59.48	595.1	5079.77	507.98	4571.79
	<b>DISTRICT TOTAL</b>	<b>27340.89</b>	<b>799.27</b>	<b>392.3</b>	<b>2837.24</b>	<b>31369.7</b>	<b>2157.43</b>	<b>29212.27</b>
<b>48</b>	<b>SINGRAULI</b>							
	Chitrangi	7830.86	211.86	0	474.32	8517.04	425.86	8091.18

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	Deosar	11946.75	246.05	0	724.52	12917.32	645.86	12271.46
	Waidhan	14187.6	380.24	0	1321.12	15888.96	794.45	15094.51
	<b>DISTRICT TOTAL</b>	<b>33965.21</b>	<b>838.15</b>	<b>0</b>	<b>2519.96</b>	<b>37323.32</b>	<b>1866.17</b>	<b>35457.15</b>
<b>49</b>	<b>TIKAMGARH</b>							
	Baldeogarh	7294.24	537.27	0	1670.8	9502.31	950.23	8552.08
	Jatara	8801.94	725.97	0	2613.23	12141.14	1214.13	10927.01
	Palera	5077.07	454.48	0	1590.51	7122.06	356.09	6765.97
	Tikamgarh	7580.54	1037.33	0	2560.15	11178.02	994.25	10183.77
	<b>DISTRICT TOTAL</b>	<b>28753.79</b>	<b>2755.05</b>	<b>0</b>	<b>8434.69</b>	<b>39943.53</b>	<b>3514.7</b>	<b>36428.83</b>
<b>50</b>	<b>UJJAIN</b>							
	Badnagar	14615.83	1230.65	0	5295.69	21142.17	2114.22	19027.95
	Ghatia	9217.38	957.39	0	3318.41	13493.18	1349.32	12143.86
	Khchrod	15677.3	812.16	0	2941.38	19430.84	971.54	18459.3
	Mahidpur	13416.48	1052.62	0	3393.99	17863.09	1786.31	16076.78
	Tarana	10221.43	749.42	0	2492.39	13463.24	673.16	12790.08
	Ujjain	8983.18	1116.72	0	4205.76	14305.66	1430.57	12875.09
	<b>DISTRICT TOTAL</b>	<b>72131.6</b>	<b>5918.96</b>	<b>0</b>	<b>21647.62</b>	<b>99698.18</b>	<b>8325.12</b>	<b>91373.06</b>
<b>51</b>	<b>UMARIA</b>							
	Karkeli	9278.95	205.13	181.25	445.51	10110.84	1011.09	9099.75
	Manpur	17454.13	186.63	328.92	512.22	18481.9	924.1	17557.8
	Pali	7731.45	25.1	149.27	75.02	7980.84	399.04	7581.8
	<b>DISTRICT TOTAL</b>	<b>34464.53</b>	<b>416.86</b>	<b>659.44</b>	<b>1032.75</b>	<b>36573.58</b>	<b>2334.23</b>	<b>34239.35</b>
<b>52</b>	<b>VIDISHA</b>							

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	Basoda	11463.6	506.48	0	1858.65	13828.73	691.44	13137.29
	Gyaraspur	9715.25	404.89	0	1522.07	11642.21	582.11	11060.1
	Kurwai	9638.9	490.55	0	1600.7	11730.15	586.51	11143.64
	Lateri	8117.76	321.64	0	999.64	9439.04	943.9	8495.14
	Nateran	9569.01	370.57	0	1481.55	11421.13	1004.41	10416.72
	Sironj	11390.25	505.21	0	2444.53	14339.99	717	13622.99
	Vidisha	14168.57	554.45	0	3769.58	18492.6	924.63	17567.97
	<b>DISTRICT TOTAL</b>	<b>74063.34</b>	<b>3153.79</b>	<b>0</b>	<b>13676.72</b>	<b>90893.85</b>	<b>5450</b>	<b>85443.85</b>
	<b>STATE TOTAL (Ham)</b>	<b>2694541.73</b>	<b>161651.93</b>	<b>12848.5</b>	<b>678366.24</b>	<b>3547408.4</b>	<b>262033.4</b>	<b>3285374.93</b>
	<b>STATE TOTAL (bcm)</b>	<b>26.95</b>	<b>1.62</b>	<b>0.13</b>	<b>6.78</b>	<b>35.47</b>	<b>2.62</b>	<b>32.85</b>

## Annexure III: Recharge from Other Sources

S N	Assessment Unit	Recharge from Canals (in Ham)	Recharge from Surface Water Irrigation (in Ham)	Recharge from Ground Water Irrigation (in Ham)	Recharge due to Tanks and Ponds (in Ham)	Recharge due to Water Conservation Structures (in Ham)	Recharge due to Pipelines (in Ham)	Total Recharge from Other Sources (in Ham )
<b>1</b>	<b>AGAR MALWA</b>							
	Agar	822.45	575.21	1480.82	405.69	243.392	0	3527.562
	Badod	0	0	1949.45	152.79	174.424	0	2276.664
	Nalkheda	0	0	2889.66	30.19	218.922	0	3138.772
	Susner	0	0	2346.74	294.65	207.404	0	2848.794
	<b>DISTRICT TOTAL</b>	<b>822.45</b>	<b>575.21</b>	<b>8666.67</b>	<b>883.32</b>	<b>844.142</b>	<b>0</b>	<b>11791.792</b>
<b>2</b>	<b>ALIRAJPUR</b>							
	Alirajpur	0	0	377.82	92.09	105.9	0	575.81
	Bhabra	0	0	247.71	81.38	62.4	0	391.49
	Jobat	0	0	272	95.94	56.76	0	424.7
	Katthiwara	0	0	240.37	66.81	35.462	0	342.642
	Sondwa	0	0	348.2	48.5	59.468	0	456.168
	Udaigarh	0	0	194.49	101.91	126	0	422.4
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>1680.59</b>	<b>486.63</b>	<b>445.99</b>	<b>0</b>	<b>2613.21</b>
<b>3</b>	<b>ANUPPUR</b>							
	Anuppur	0	0	25.6	7.01	37.51	0	70.12
	Jaithari	0	0	216.68	13	43.886	0	273.566
	Kotma	0	0	59.61	6.83	24.596	0	91.036
	Pushparajgarh	0	0	69	19.64	77.574	0	166.214
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>370.89</b>	<b>46.48</b>	<b>183.566</b>	<b>0</b>	<b>600.936</b>
<b>4</b>	<b>ASHOKNAGAR</b>							
	Ashoknagar	78	343.51	1537.49	16.74	154.154	0	2129.894
	Chanderi	63.7	343.51	1095.13	58.33	94.066	0	1654.736

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	Isagarh	19	23.09	1554.84	16.72	136.772	0	1750.422
	Mungaoli	917.46	2202.53	1157.89	312.52	139.09	0	4729.49
	<b>DISTRICT TOTAL</b>	<b>1078.16</b>	<b>2912.64</b>	<b>5345.35</b>	<b>404.31</b>	<b>524.082</b>	<b>0</b>	<b>10264.542</b>
<b>5</b>	<b>BALAGHAT</b>							
	Baihar	0	0	53.3	7.99	171.324	0	232.614
	Balaghat	97.4	99.12	548.3	359.19	111.086	0	1215.096
	Birsa	0	0	34.47	37.26	164.36	0	236.09
	Katangi	76.46	74.13	790.59	137.58	78.542	0	1157.302
	Khairlanji	35.47	14.96	519.64	69.59	85.282	0	724.942
	Kirnapur	0	0	484.27	37.26	88.122	0	609.652
	Lalbarra	102.21	183.53	565.34	375.78	80.44	0	1307.3
	Lanji	108.09	92.36	346.94	32.79	79.238	0	659.418
	Paraswada	0	0	31.84	58.37	117.712	0	207.922
	Waraseoni	56.74	109.44	426.02	96.87	79.654	0	768.724
	<b>DISTRICT TOTAL</b>	<b>476.37</b>	<b>573.54</b>	<b>3800.71</b>	<b>1212.68</b>	<b>1055.76</b>	<b>0</b>	<b>7119.06</b>
<b>6</b>	<b>BARWANI</b>							
	Barwani	153.87	893.91	712.84	18.09	338.206	0	2116.916
	Niwali	3.76	37.5	538.17	11.13	224.634	0	815.194
	Pansemal	89.67	370.82	2004.09	123.7	421.208	0	3009.488
	Pati	9.77	88.83	302.28	25.18	340.018	0	766.078
	Rajpur	249.08	1352.11	2103.88	703.15	429.392	0	4837.612
	Sendhwa	62.71	622.73	924.43	467.76	467.348	0	2544.978
	Thikri	509.75	6304.11	1758.64	53.59	382.036	0	9008.126
	<b>DISTRICT TOTAL</b>	<b>1078.61</b>	<b>9670.01</b>	<b>8344.33</b>	<b>1402.6</b>	<b>2602.842</b>	<b>0</b>	<b>23098.392</b>

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<b>7</b>	<b>BETUL</b>							
	Amla	50.89	640.74	1731.92	201.79	132.89	0	2758.23
	Athner	7.1	181.96	674.8	167.11	74.102	0	1105.072
	Betul	19.36	463.44	2624.92	252.31	99.944	0	3459.974
	Bhainsdehi	32.48	331.26	878.68	287.13	80.2	0	1609.75
	Bhimpur	0	0	644.87	117.44	102.006	0	864.316
	Chicholi	20.52	96.42	617.4	74.12	59.114	0	867.574
	Ghoda Dongri	15.94	381.02	558.84	143.42	149.46	0	1248.68
	Multai	39.36	427.68	2395.77	363.71	63.248	0	3289.768
	Prabhat Pattan	22.44	438.57	517.7	155.68	100.186	0	1234.576
	Shahpur	13.82	135.92	561.03	147.03	94.284	0	952.084
	<b>DISTRICT TOTAL</b>	<b>221.91</b>	<b>3097.01</b>	<b>11205.93</b>	<b>1909.74</b>	<b>955.434</b>	<b>0</b>	<b>17390.024</b>
<b>8</b>	<b>BHIND</b>							
	Ater	726.51	496.91	978.48	0	55.51	0	2257.41
	Bhind	1158.47	693.94	861.41	0	39.916	0	2753.736
	Gohad	2101.2	140.94	1356.76	1.15	74.898	0	3674.948
	Lahar	822.29	670.62	663.55	0	41.052	0	2197.512
	Mehgaon	1132.03	1805.37	1131.09	0	80.894	0	4149.384
	Ron	86.66	52.73	288.25	0	9.322	0	436.962
	<b>DISTRICT TOTAL</b>	<b>6027.16</b>	<b>3860.51</b>	<b>5279.54</b>	<b>1.15</b>	<b>301.592</b>	<b>0</b>	<b>15469.952</b>
<b>9</b>	<b>BHOPAL</b>							
	Berasia	0	0	3392.28	181.55	296.01	0	3869.84
	Bhopal Urban	0	0	0	437.61	0.00	1234.61	1672.22

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	Phanda	0	0	2586.81	870.98	73.37	0	3531.16
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>5979.09</b>	<b>1490.14</b>	<b>369.378</b>	<b>1234.6125</b>	<b>9073.2205</b>
<b>10</b>	<b>BURHANPUR</b>							
	Burhanpur	64.28	666.25	2302.05	301.72	777.422	0	4111.72
	Khaknar	19.67	574.64	2563.74	332.63	970.298	0	4460.98
	<b>DISTRICT TOTAL</b>	<b>83.95</b>	<b>1240.89</b>	<b>4865.79</b>	<b>634.35</b>	<b>1747.72</b>	<b>0</b>	<b>8572.7</b>
<b>11</b>	<b>CHHATARPUR</b>							
	Bada Malhera	782.34	759.35	1707.72	216.07	157.63	0	3623.11
	Bijawar	20.68	16.31	2193.93	70.3	188.64	0	2489.86
	Buxwaha	36.59	81	1230.44	63.12	372.18	0	1783.33
	Chhatarpur	419.04	449.6	1678.96	172.04	158.644	0	2878.28
	Gaurihar	485.38	266.33	404.42	7.43	190.06	0	1353.62
	Laundi	1277.45	127.01	1210.25	409.87	134.826	0	3159.41
	Nowgaon	470.64	78.62	1635.32	975.01	190.55	0	3350.14
	Rajnagar	365.94	199.37	2373.62	125.74	382.036	0	3446.71
	<b>DISTRICT TOTAL</b>	<b>3858.06</b>	<b>1977.59</b>	<b>12434.66</b>	<b>2039.58</b>	<b>1774.566</b>	<b>0</b>	<b>22084.456</b>
<b>12</b>	<b>CHHINDWARA</b>							
	Amarwara	0	0	1443.11	93.03	82.262	0	1618.40
	Bichhua	0	0	700.09	111.76	11.104	0	822.95
	Chaurai	0	0	1823.25	29.52	12.06	0	1864.83
	Chhindwara	0	0	2227.22	24.61	140.64	0	2392.47
	Harrai	0	0	699.86	21.74	34.334	0	755.93
	Jamai	0	0	840.05	5.03	53.826	0	898.91
	Mohkheda	562.97	889.38	1851.22	74.82	138.43	0	3516.82

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	Pandhurna	0	0	2281.5	150.8	49.384	0	2481.68
	Parasia	0	0	1007.3	10.77	34.68	0	1052.75
	Sausar	145.6	345.3	875.13	270.64	153.78	0	1790.45
	Tamia	0	0	179.79	74.66	41.76	0	296.21
	<b>DISTRICT TOTAL</b>	<b>708.57</b>	<b>1234.68</b>	<b>13928.52</b>	<b>867.38</b>	<b>752.26</b>	<b>0</b>	<b>17491.41</b>
<b>13</b>	<b>DAMOH</b>							
	Batiyagarh	89.83	151.2	995.32	86.86	135.046	0	1458.26
	Damoh	129.38	606.31	836.06	245.54	20.848	0	1838.14
	Hatta	48.38	162	382.07	410.87	51.292	0	1054.61
	Jabera	898.03	1483.49	536.59	410.05	64.488	0	3392.65
	Patera	27.93	172.8	597.52	130.64	38.44	0	967.33
	Patharia	21.77	54	1038.46	47.66	68.746	0	1230.64
	Tendulheda	188.06	681.8	303.4	236.99	49.64	0	1459.89
	<b>DISTRICT TOTAL</b>	<b>1403.38</b>	<b>3311.6</b>	<b>4689.42</b>	<b>1568.61</b>	<b>428.5</b>	<b>0</b>	<b>11401.51</b>
<b>14</b>	<b>DATIA</b>							
	Bhander	133.57	1954.45	835.32	11.75	132.304	0	3067.39
	Datia	324.92	492.12	761.48	11.49	223.188	0	1813.20
	Seondha	623.35	991.12	1547.41	3.1	107.47	0	3272.45
	<b>DISTRICT TOTAL</b>	<b>1081.84</b>	<b>3437.69</b>	<b>3144.21</b>	<b>26.34</b>	<b>462.962</b>	<b>0</b>	<b>8153.042</b>
<b>15</b>	<b>DEWAS</b>							
	Bagli	17.67	57.29	3260.62	69.49	565.262	0	3970.33
	Dewas	0	0	3969.23	46.84	464.096	0	4480.17
	Kannod	250.14	827.59	1677.58	200.12	519.278	0	3474.71
	Khategaon	0	0	2405.24	16.34	249.922	0	2671.50

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	Sonkutch	0	0	2348.22	74.31	420.198	0	2842.73
	Tonkkhurd	0	0	1428.45	61.79	1543.142	0	3033.38
	<b>DISTRICT TOTAL</b>	<b>267.81</b>	<b>884.88</b>	<b>15089.34</b>	<b>468.89</b>	<b>3761.898</b>	<b>0</b>	<b>20472.818</b>
<b>16</b>	<b>DHAR</b>							
	Badnawar	184.31	432.35	4660.31	206.44	73.86	0	5557.27
	Bagh	79.06	860.92	378.1	142.64	30.994	0	1491.71
	Dahi	351.21	2810.98	591.58	51.49	136.44	0	3941.70
	Dhar	0	0	3491.49	21.69	155.652	0	3668.83
	Dharmपुर	504.26	3336.71	412.26	321.72	13.2	0	4588.15
	Gandhwani	224.53	5079.4	773.32	172.5	213.276	0	6463.03
	Kukshi	60.42	1196.99	369.93	62.43	70.8	0	1760.57
	Manawar	241.52	4146.37	663.08	173.76	105.06	0	5329.79
	Nalchha	28.59	135.3	3013.5	110.61	91.68	0	3379.68
	Nisarपुर	230.05	2426.84	482.84	23.64	52.26	0	3215.63
	Sardarpur	880.57	1851.49	1910.71	1032.59	100.62	0	5775.98
	Tirla	0	0	1837.25	96.89	713.856	0	2648.00
	Umarvan	839.53	2459.8	487.75	410.12	96.78	0	4293.98
	<b>DISTRICT TOTAL</b>	<b>3624.05</b>	<b>24737.15</b>	<b>19072.12</b>	<b>2826.52</b>	<b>1854.478</b>	<b>0</b>	<b>52114.32</b>
<b>17</b>	<b>DINDORI</b>							
	Amarपुर	0	0	40.43	0	44.888	0	85.32
	Bajang	0	0	31.01	0	41.596	0	72.61
	Dindori	0	0	81.24	0	43.966	0	125.21
	Karanjiya	0	0	61.78	0	52.83	0	114.61
	Menhadwani	0	0	55.9	0	38.07	0	93.97

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	Samnapur	0	0	84.67	0	72.6	0	157.27
	Shahpura	0	0	223.99	0	33.554	0	257.54
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>579.02</b>	<b>0</b>	<b>327.504</b>	<b>0</b>	<b>906.52</b>
<b>18</b>	<b>GUNA</b>							
	Aron	0	0	1830.07	2.86	84.426	0	1917.36
	Bamori	992.9	999.73	2390.64	440.32	91.492	0	4915.08
	Chachaura	297.44	60.59	2960.41	63.51	90.746	0	3472.70
	Guna	394.68	169.29	2342.25	69.87	120.748	0	3096.84
	Raghogarh	429.43	2410.45	2378.84	495.16	75.37	0	5789.25
	<b>DISTRICT TOTAL</b>	<b>2114.45</b>	<b>3640.06</b>	<b>11902.21</b>	<b>1071.72</b>	<b>462.782</b>	<b>0</b>	<b>19191.222</b>
<b>19</b>	<b>GWALIOR</b>							
	Bhitarwar	1685.54	7708.36	1108.01	281.21	81.91	0	10865.03
	Dabra	1483.02	7341.3	961.6	216.32	85.132	0	10087.37
	Ghatigaon	740.97	574.17	755.18	372.05	124.95	0	2567.32
	Gwalior Urban		0	0	149.63		459.9	609.53
	Morar		0	1688.24	165.36	68.988	0	1922.59
	<b>DISTRICT TOTAL</b>	<b>3909.53</b>	<b>15623.83</b>	<b>4513.03</b>	<b>1184.57</b>	<b>360.98</b>	<b>459.9</b>	<b>26051.84</b>
<b>20</b>	<b>HARDA</b>							
	Harda	301.59	85.05	1525.07	53.03	53.91	0	2018.65
	Khirkiya	0	0	952.56	0	16.638	0	969.20
	Timarni	7276.5	7371	1126.22	0	13.628	0	15787.35
	<b>DISTRICT TOTAL</b>	<b>7578.09</b>	<b>7456.05</b>	<b>3603.85</b>	<b>53.03</b>	<b>84.176</b>	<b>0</b>	<b>18775.20</b>
<b>21</b>	<b>HOSHANGABAD</b>							
	Babai	2641.44	3510	659.99	0	13.432	0	6824.86

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	Bankhedi		0	3643.92	0	22.99	0	3666.91
	Hoshangabad	5695.9	6804	946.89	0	19.102	0	13465.89
	Kesala	3234.86	2532.6	943.06	54.79	61.798	0	6827.11
	Pipariya	213.63	196.37	1887.41	64.01	58.194	0	2419.61
	Seoni Malwa	3864.18	7446.6	927.18	0	32.936	0	12270.90
	Shohagpur	2039.75	252.69	1007.86	6.84	35.474	0	3342.61
	<b>DISTRICT TOTAL</b>	<b>17689.76</b>	<b>20742.26</b>	<b>10016.31</b>	<b>125.64</b>	<b>243.926</b>	<b>0</b>	<b>48817.90</b>
<b>22</b>	<b>INDORE</b>							
	Depalpur	3.86	159.89	5814.63	363.91	67.374	0	6409.66
	Indore	0	0	2678.98	189.91	51.872	0	2920.76
	Indore Urban	0	0	0	209.85	175.6	1231.875	1617.33
	Mhow	49.31	64.96	1875.95	400.24	85.186	0	2475.65
	Sawer	0	0	3235.84	354.11	112.06	0	3702.01
	<b>DISTRICT TOTAL</b>	<b>53.17</b>	<b>224.85</b>	<b>13605.4</b>	<b>1518.02</b>	<b>492.092</b>	<b>1231.875</b>	<b>17125.41</b>
<b>23</b>	<b>JABALPUR</b>							
	Bargi	35.87	158.58	589.14	67.69	39.18	0	890.46
	Jabalpur Urban	0	0	0	12.17	21.366	547.5	581.04
	Kundam	0	0	256.25	23.89	225.976	0	506.12
	Majholi	0	0	766.59	6.39	126.82	0	899.80
	Panagar	15.88	16.96	1368.82	94.32	99.61	0	1595.59
	Patan	127.71	1914.48	1735.71	42.02	108.924	0	3928.84
	Shahpura	87.44	204.35	1504.03	46.41	84.666	0	1926.90
	Sihora	24.47	643.68	837.26	33.97	132.562	0	1671.94
	<b>DISTRICT TOTAL</b>	<b>291.37</b>	<b>2938.05</b>	<b>7057.8</b>	<b>326.86</b>	<b>839.104</b>	<b>547.5</b>	<b>12000.68</b>

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<b>24</b>	<b>JHABUA</b>							
	Jhabua	0	0	315.42	127.22	80.1	0	522.74
	Meghnagar	0	0	321.34	135.38	49.86	0	506.58
	Petlawad	138.7	2064.42	569.96	559.76	95.46	0	3428.30
	Rama	0	0	285.76	210.6	49.02	0	545.38
	Ranapur	0	0	201.53	63.69	70.44	0	335.66
	Thandla	0	0	336.53	169.69	86.1	0	592.32
	<b>DISTRICT TOTAL</b>	<b>138.7</b>	<b>2064.42</b>	<b>2030.54</b>	<b>1266.34</b>	<b>430.98</b>	<b>0</b>	<b>5930.98</b>
<b>25</b>	<b>KATNI</b>							
	Badwara	148.13	513.11	879.37	78.74	320.192	0	1939.54
	Bahoriband	145.6	345.3	586.41	270.64	127.458	0	1475.41
	Dhimar Kheda	0	0	296.21	95.42	111.212	0	502.84
	Murwara	162.78	305	772.47	53.03	139.968	0	1433.25
	Rithi	6.15	106.76	349.56	15.24	81.074	0	558.78
	Vijayraghavgarh	0	0	619.65	10.2	38.112	0	667.96
	<b>DISTRICT TOTAL</b>	<b>462.66</b>	<b>1270.17</b>	<b>3503.67</b>	<b>523.27</b>	<b>818.016</b>	<b>0</b>	<b>6577.79</b>
<b>26</b>	<b>KHANDWA</b>							
	Baldi	0	0	813	0	146.47	0	959.47
	Chhegaon Makhan	26.27	231.72	2464.69	108.83	222.526	0	3054.04
	Harsud	0	0	649.52	8.49	287.692	0	945.70
	Khalwa	0	0	1515.94	152.1	195.62	0	1863.66
	Khandwa	7.52	231.84	1498.39	7.8	416.67	0	2162.22
	Pandhana	172.06	2558.86	2227.36	392.05	425.806	0	5776.14

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	Punasa	937.36	37309.5	966.5	2667.1	301.152	0	42181.61
	<b>DISTRICT TOTAL</b>	<b>1143.21</b>	<b>40331.92</b>	<b>10135.4</b>	<b>3336.37</b>	<b>1995.936</b>	<b>0</b>	<b>56942.84</b>
<b>27</b>	<b>KHARGONE</b>							
	Barwaha	1223.18	6696.95	1757.74	382.63	739.218	0	10799.72
	Bhagwanpura	122.27	891.87	654.75	481.02	1127.588	0	3277.50
	Bhikangaon	328.35	1780.35	1204.82	511.23	484.214	0	4308.96
	Gogawan	214.69	689.46	705.92	15.45	219.644	0	1845.16
	Jhiranya	173.58	412.54	970.01	679.69	1277.832	0	3513.65
	Kasrawad	1104.43	6207.86	1323.3	580.51	1145.694	0	10361.79
	Khargone	183.36	163.08	1005.26	178.85	335.392	0	1865.94
	Maheshwar	467.16	2980.1	1160.17	263.34	560.97	0	5431.74
	Segaon	71.85	473.88	649.55	183.99	462.788	0	1842.06
	<b>DISTRICT TOTAL</b>	<b>3888.87</b>	<b>20296.09</b>	<b>9431.52</b>	<b>3276.71</b>	<b>6353.34</b>	<b>0</b>	<b>43246.53</b>
<b>28</b>	<b>MANDLA</b>							
	Bichhiya	488.76	232.2	284.35	147.89	67.422	0	1220.62
	Bijadandi	0	0	56.7	14.46	22.054	0	93.21
	Ghughari	0	0	61.36	35.99	46.466	0	143.82
	Mandla	275.07	151.2	230.18	147.89	56.604	0	860.94
	Mawai	0	0	235.71	0	61.842	0	297.55
	Mohgaon	0	0	264.46	17.01	45.888	0	327.36
	Nainpur	1050.62	151.2	255.62	160.37	49.378	0	1667.19
	Narayanganj	0	0	180.23	124.45	44.676	0	349.36
	Niwas	0	0	183.46	66.87	28.384	0	278.71
	<b>DISTRICT TOTAL</b>	<b>1814.45</b>	<b>534.6</b>	<b>1752.07</b>	<b>714.93</b>	<b>422.714</b>	<b>0</b>	<b>5238.76</b>

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<b>29</b>	<b>MANDSAUR</b>							
	Bhanpura	121.8	279.94	1453.95	729.76	413.34	0	2998.79
	Garoth	67.2	139.97	2860.66	453.97	1176.162	0	4697.96
	Malhargarh	92.4	186.62	2084.88	669.88	1023.256	0	4057.04
	Mandsaur	25.2	93.31	4128.56	322.56	340.348	0	4909.98
	Sitamau	21	93.31	5201.66	467.56	351.706	0	6135.24
	<b>DISTRICT TOTAL</b>	<b>327.6</b>	<b>793.15</b>	<b>15729.71</b>	<b>2643.73</b>	<b>3304.812</b>	<b>0</b>	<b>22799.00</b>
<b>30</b>	<b>MORENA</b>							
	Ambah	1412.28	264.67	330.84	3.89	35.26	0	2046.94
	Jaora	1590.32	789.41	587.27	34.72	128.7	0	3130.42
	Kailaras	784.25	546.34	621.51	41.48	149.732	0	2143.31
	Morena	833.84	636.12	856.85	198.17	192.84	0	2717.82
	Pahadgarh	1496.22	328.92	597.09	49.1	134.454	0	2605.78
	Porsa	1149.24	116.57	103.67	38.78	63.894	0	1472.15
	Sabalgarh	2771.12	1495.58	1058.45	24.82	161.028	0	5511.00
	<b>DISTRICT TOTAL</b>	<b>10037.27</b>	<b>4177.61</b>	<b>4155.68</b>	<b>390.96</b>	<b>865.908</b>	<b>0</b>	<b>19627.43</b>
<b>31</b>	<b>NARSINGHPUR</b>							
	Chawarpatha	0	0	2140.34	0.91	14.222	0	2155.47
	Chichli	0	0	2568.24	1.32	15.184	0	2584.74
	Gotegaon	860.62	129.6	2841.21	0.09	6.3	0	3837.82
	Kareli	355.04	112.5	3210.19	0	9.54	0	3687.27
	Narsinghpur	860.61	129.6	3956.79	0	11.948	0	4958.95
	Saikheda	0	0	1933.58	1.32	17.642	0	1952.54
	<b>DISTRICT TOTAL</b>	<b>2076.27</b>	<b>371.7</b>	<b>16650.35</b>	<b>3.64</b>	<b>74.836</b>	<b>0</b>	<b>19176.80</b>

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<b>32</b>	<b>NEEMUCH</b>							
	Jawad	121.8	223.78	2837.08	139.16	360.092	0	3681.91
	Manasa	58.8	139.97	2139.16	418.89	551.792	0	3308.61
	Neemuch	21	83.81	3542.01	195.39	413.848	0	4256.06
	<b>DISTRICT TOTAL</b>	<b>201.6</b>	<b>447.56</b>	<b>8518.25</b>	<b>753.44</b>	<b>1325.732</b>	<b>0</b>	<b>11246.58</b>
<b>33</b>	<b>NIWARI</b>							
	Niwari	184.75	389.77	1055.92	245.32	336.644	0	2212.40
	Prithvipur	116.45	179.5	1824.09	183.67	668.058	0	2971.77
	<b>DISTRICT TOTAL</b>	<b>301.2</b>	<b>569.27</b>	<b>2880.01</b>	<b>428.99</b>	<b>1004.702</b>	<b>0</b>	<b>5184.17</b>
<b>34</b>	<b>PANNA</b>							
	Ajaigarh	71.47	358.02	1544.04	126.33	73.28	0	2173.14
	Gunnor	59.39	324.86	428.31	309.95	52.518	0	1175.03
	Panna	122.53	358.02	766.69	111.73	46.674	0	1405.64
	Pawai	150.37	388.26	753.78	194.57	66.34	0	1553.32
	Shahnagar	238.1	421.2	449.95	143.45	71.54	0	1324.24
	<b>DISTRICT TOTAL</b>	<b>641.86</b>	<b>1850.36</b>	<b>3942.77</b>	<b>886.03</b>	<b>310.352</b>	<b>0</b>	<b>7631.37</b>
<b>35</b>	<b>RAISEN</b>							
	Badi	225.28	91.09	749.55	1762.99	49.41	0	2878.32
	Begamganj	0	0	1419.22	11.42	128.482	0	1559.12
	Gairatganj	0	0	1192.21	67.89	111.392	0	1371.49
	Obedullaganj	0	0	1771.31	392.75	59.714	0	2223.77
	Sanchi	0	0	1831.63	115.58	70.452	0	2017.66
	Silwani	0	0	2087.49	7.71	82.506	0	2177.71

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	Udaipura	0	0	1605.59	54.58	34.038	0	1694.21
	<b>DISTRICT TOTAL</b>	<b>225.28</b>	<b>91.09</b>	<b>10657</b>	<b>2412.92</b>	<b>535.994</b>	<b>0</b>	<b>13922.28</b>
<b>36</b>	<b>RAJGARH</b>							
	Biaora	0	0	3609.81	94	237.298	0	3941.11
	Jirapur	0	0	2291.57	59.57	143.142	0	2494.28
	Khilchipur	0	0	2380.08	106.44	114.868	0	2601.39
	Narsinghgarh	0	0	3818.88	187.38	324.964	0	4331.22
	Rajgarh	0	0	2791.75	261.96	163.144	0	3216.85
	Sarangpur	0	0	3495.76	26.53	141.58	0	3663.87
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>18387.85</b>	<b>735.88</b>	<b>1124.996</b>	<b>0</b>	<b>20248.73</b>
<b>37</b>	<b>RATLAM</b>							
	Alot	0	0	4361.21	41.06	346.132	0	4748.40
	Bajna	1008	19.44	1189.91	274.92	602.278	0	3094.55
	Jaora	0	0	6234.35	237.38	240.172	0	6711.90
	Piploda	0	0	4729.59	26.64	128.914	0	4885.14
	Ratlam	0	0	7283.15	205.88	1773.538	0	9262.57
	Sailana	0	0	1061.36	64.53	480.58	0	1606.47
	<b>DISTRICT TOTAL</b>	<b>1008</b>	<b>19.44</b>	<b>24859.57</b>	<b>850.41</b>	<b>3571.614</b>	<b>0</b>	<b>30309.03</b>
<b>38</b>	<b>REWA</b>							
	Gangev	149.88	318.7	601.05	46.66	84.022	0	1200.31
	Hanumana	0	0	354.82	37.19	86.834	0	478.84
	Jawa	0	0	601.99	0	41.522	0	643.51
	Mauganj	0	0	558.55	88.44	40.426	0	687.42
	Naigarhi	0	0	376.52	0	30.648	0	407.17

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	Rampur Karchuliyan	693.68	503.74	603.48	11.93	51.748	0	1864.58
	Rewa	899.18	48.79	653.31	104.48	21.162	0	1726.92
	Sirmour	484.61	18.19	717.13	106.24	68.866	0	1395.04
	Teonthar	0	0	876.22	14.23	38.186	0	928.64
	<b>DISTRICT TOTAL</b>	<b>2227.35</b>	<b>889.42</b>	<b>5343.07</b>	<b>409.17</b>	<b>463.414</b>	<b>0</b>	<b>9332.42</b>
<b>39</b>	<b>SAGAR</b>							
	Banda	71.13	1.25	1500.98	118.31	39.09	0	1730.76
	Bina	13.89	3.69	1901.91	33.27	50.48	0	2003.24
	Deori	102.83	174.96	1209.91	244.97	44.918	0	1777.59
	Jaisinagar	55.82	2.16	1561.63	110.93	22.374	0	1752.91
	Kesli	145.58	21.6	1520.71	234.9	63.26	0	1986.05
	Khurai	17.63	5.4	1106.74	59.23	60.636	0	1249.64
	Malthon	12.48	3.4	789.21	50	47.078	0	902.17
	Rahatgarh	12.87	2.16	1320.81	51.45	39.204	0	1426.49
	Rehli	68.44	27.81	920.56	62.71	199.022	0	1278.54
	Sagar	34.27	10.8	1848.79	73.91	65.638	0	2033.41
	Shahnnagar	354.68	807.98	710.37	324.27	26.146	0	2223.45
	<b>DISTRICT TOTAL</b>	<b>889.62</b>	<b>1061.21</b>	<b>14391.62</b>	<b>1363.95</b>	<b>657.846</b>	<b>0</b>	<b>18364.25</b>
<b>40</b>	<b>SATNA</b>							
	Amarpatan	18.27	1283.87	1317.36	31.61	156.88	0	2807.99
	Maiihar	0	0	972	4.41	61.828	0	1038.24
	Majhgawan	0	0	1040.17	46.29	127.492	0	1213.95
	Nagod	18.27	1283.87	1746.59	18.93	129.178	0	3196.84
	Ramnagar	0	0	465.75	5.56	44.504	0	515.81

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	Rampur-Baghelan	334.91	1496.39	1715.77	10.71	86.828	0	3644.61
	Sohawal	204.35	385.47	1577.62	0.14	210.674	0	2378.25
	Unchehara	18.27	1216.3	1019.31	18.93	150.888	0	2423.70
	<b>DISTRICT TOTAL</b>	<b>594.07</b>	<b>5665.9</b>	<b>9854.57</b>	<b>136.58</b>	<b>968.272</b>	<b>0</b>	<b>17219.39</b>
<b>41</b>	<b>SEHORE</b>							
	Ashta	201.14	399.96	2926.96	198.29	174.602	0	3900.95
	Budni	2039.92	1233.36	908.86	256.87	63.52	0	4502.53
	Ichhawar	54.42	111.96	1227.28	114.41	139.914	0	1647.98
	Nasrullaganj	800.07	939.49	1408.78	531.16	150.14	0	3829.64
	Sehore	151.99	439.56	3424.26	310.85	161.396	0	4488.06
	<b>DISTRICT TOTAL</b>	<b>3247.54</b>	<b>3124.33</b>	<b>9896.14</b>	<b>1411.58</b>	<b>689.572</b>	<b>0</b>	<b>18369.16</b>
<b>42</b>	<b>SEONI</b>							
	Barghat	216.91	114.29	833.65	14	118.71	0	1297.56
	Chhapara	0	0	994.68	39.11	105.368	0	1139.16
	Dhanora	25.94	108.04	269.91	14.59	33.272	0	451.75
	Ghansaur	0	0	334.31	25.7	29.216	0	389.23
	Keolari	176.4	343.69	314.96	14.72	41.144	0	890.91
	Kurai	0	0	760.61	27.58	93.402	0	881.59
	Lakhnadon	0	0	1168.93	20.57	77.276	0	1266.78
	Seoni	189.7	331.06	1625.35	268.62	93.238	0	2507.97
	<b>DISTRICT TOTAL</b>	<b>608.95</b>	<b>897.08</b>	<b>6302.4</b>	<b>424.89</b>	<b>591.626</b>	<b>0</b>	<b>8824.95</b>
<b>43</b>	<b>SHAHDOL</b>							
	Beohari	456.58	0	230.18	79.96	14.402	0	781.12
	Burhar	0	0	55.08	15.96	12.986	0	84.03

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	Gohparu	0	0	56.86	11.69	3.452	0	72.00
	Jaisinghnagar	0	0	277.02	23.35	31.212	0	331.58
	Sohagpur	0	0	162	23.44	7.332	0	192.77
	<b>DISTRICT TOTAL</b>	<b>456.58</b>	<b>0</b>	<b>781.14</b>	<b>154.4</b>	<b>69.384</b>	<b>0</b>	<b>1461.50</b>
<b>44</b>	<b>SHAJAPUR</b>							
	Kalapipal	0	0	3551.29	83.81	139.264	0	3774.36
	Moman Badodiya	0	0	4058.18	63.03	138.774	0	4259.98
	Shajapur	0	0	2339.77	330.45	228.76	0	2898.98
	Shujalpur	0	0	3246.47	94.5	128.258	0	3469.23
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>13195.71</b>	<b>571.79</b>	<b>635.056</b>	<b>0</b>	<b>14402.56</b>
<b>45</b>	<b>SHEOPUR</b>							
	Karahal	0	0	1521.96	307.32	34.42	0	1863.70
	Sheopur	12023.91	3138.48	690.05	26.93	129.614	0	16008.98
	Vijaypur	720.89	120.81	1438.5	60.8	250.784	0	2591.78
	<b>DISTRICT TOTAL</b>	<b>12744.8</b>	<b>3259.29</b>	<b>3650.51</b>	<b>395.05</b>	<b>414.818</b>	<b>0</b>	<b>20464.47</b>
<b>46</b>	<b>SHIVPURI</b>							
	Badarwas	175.09	399.81	2194.31	86.93	60.908	0	2917.05
	Karera	502.67	411.29	805.19	193.48	61.706	0	1974.34
	Khaniyadhana	292.6	369.49	1761.84	221.49	129.938	0	2775.36
	Kolaras	0	0	1707.56	56.55	86.652	0	1850.76
	Narwar	553.43	593.21	1446.77	196.47	97.67	0	2887.55
	Pichhore	197.11	723.79	1263.3	212.48	69.348	0	2466.03
	Pohari	137.79	129.6	1412.55	182.89	62.58	0	1925.41

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	Shivpuri	82.75	224.64	1480.65	227.68	73.694	0	2089.41
	<b>DISTRICT TOTAL</b>	<b>1941.44</b>	<b>2851.83</b>	<b>12072.17</b>	<b>1377.97</b>	<b>642.496</b>	<b>0</b>	<b>18885.91</b>
<b>47</b>	<b>SIDHI</b>							
	Kusmi	0	0	430.92	22.58	56.308	0	509.81
	Majholi	0	0	380.16	14.53	67.202	0	461.89
	Rampur Naikin	540.54	23.96	393.77	72.06	60.9	0	1091.23
	Sidhi	69.65	23.96	515.33	145.3	74.61	0	828.85
	Sihawal	398.46	23.96	167.93	85.51	68.882	0	744.74
	<b>DISTRICT TOTAL</b>	<b>1008.65</b>	<b>71.88</b>	<b>1888.11</b>	<b>339.98</b>	<b>327.902</b>	<b>0</b>	<b>3636.52</b>
<b>48</b>	<b>SINGRAULI</b>							
	Chitrangi	0	0	436.05	107.27	142.86	0	686.18
	Deosar	45.36	41.94	686.81	45.32	151.132	0	970.56
	Waidhan	75.41	96.35	1122.08	203.19	204.33	0	1701.36
	<b>DISTRICT TOTAL</b>	<b>120.77</b>	<b>138.29</b>	<b>2244.94</b>	<b>355.78</b>	<b>498.322</b>	<b>0</b>	<b>3358.10</b>
<b>49</b>	<b>TIKAMGARH</b>							
	Baldeogarh	159.37	197.75	1465.28	301.83	83.848	0	2208.08
	Jatara	124.46	450.58	2206.13	340.81	217.226	0	3339.21
	Palera	59.46	462.02	1192.1	207.43	123.976	0	2044.99
	Tikamgarh	133.72	444.74	1922.2	945.08	151.732	0	3597.47
	<b>DISTRICT TOTAL</b>	<b>477.01</b>	<b>1555.09</b>	<b>6785.71</b>	<b>1795.15</b>	<b>576.782</b>	<b>0</b>	<b>11189.74</b>
<b>50</b>	<b>UJJAIN</b>							
	Badnagar	0	0	6356.76	90.26	79.32	0	6526.34
	Ghatia	0	0	3822.01	215.91	237.89	0	4275.81
	Khchrod	0	0	3164.86	341.6	247.088	0	3753.55

S N	Assessment Unit	Recharge from Canals (in Ham)	Recharge from Surface Water Irrigation (in Ham)	Recharge from Ground Water Irrigation (in Ham)	Recharge due to Tanks and Ponds (in Ham)	Recharge due to Water Conservation Structures (in Ham)	Recharge due to Pipelines (in Ham)	Total Recharge from Other Sources (in Ham )
	Mahidpur	0	0	3251.29	827.1	368.22	0	4446.61
	Tarana	0	0	2625.16	254.15	362.492	0	3241.80
	Ujjain	0	0	4651.44	626.36	44.68	0	5322.48
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>23871.52</b>	<b>2355.38</b>	<b>1339.69</b>	<b>0</b>	<b>27566.59</b>
<b>51</b>	<b>UMARIA</b>							
	Karkeli	0	0	381.03	234.93	34.686	0	650.65
	Manpur	0	0	605.88	64.95	28.024	0	698.85
	Pali	0	0	86.84	10.7	2.582	0	100.12
	<b>DISTRICT TOTAL</b>	<b>0</b>	<b>0</b>	<b>1073.75</b>	<b>310.58</b>	<b>65.292</b>	<b>0</b>	<b>1449.62</b>
<b>52</b>	<b>VIDISHA</b>							
	Basoda	20.67	10.91	2234.94	46.27	52.348	0	2365.14
	Gyaraspur	0	0	1862.51	2.7	61.75	0	1926.96
	Kurwai	0	0	2023.06	7.61	60.576	0	2091.25
	Lateri	0	0	1076.2	40.26	204.816	0	1321.28
	Nateran	114.92	16.04	1510.72	111.46	98.982	0	1852.12
	Sironj	511.95	143.86	2107.41	125.69	60.83	0	2949.74
	Vidisha	1542.55	516.46	2109.95	87.03	68.03	0	4324.02
	<b>DISTRICT TOTAL</b>	<b>2190.09</b>	<b>687.27</b>	<b>12924.79</b>	<b>421.02</b>	<b>607.332</b>	<b>0</b>	<b>16830.50</b>
	<b>STATE TOTAL (Ham)</b>	<b>101142.53</b>	<b>201157.47</b>	<b>432085.32</b>	<b>50595.45</b>	<b>51563.47</b>	<b>3473.89</b>	<b>840018.13</b>
	<b>STATE TOTAL (bcm)</b>	<b>1.01</b>	<b>2.01</b>	<b>4.32</b>	<b>0.51</b>	<b>0.52</b>	<b>0.03</b>	<b>8.40</b>

## Annexure IV: Ground Water Extraction Scenario

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
<b>1</b>	<b>AGAR MALWA</b>								
	Agar	5923.27	0	562.20	6485.45	603.42	4303.46	59.88	safe
	Badod	7797.81	3.6719	421.44	8222.9	445.22	2210.29	78.64	semi critical
	Nalkheda	11558.65	0	307.57	11866.22	322.52	0	124.44	over_exploited
	Susner	9386.93	0	375.45	9762.39	395.16	0	101.90	over_exploited
	<b>DISTRICT TOTAL</b>	<b>34666.65</b>	<b>3.67</b>	<b>1666.65</b>	<b>36336.96</b>	<b>1766.32</b>	<b>6513.75</b>	<b>89.94</b>	
<b>2</b>	<b>ALIRAJPUR</b>								
	Alirajpur	1511.28	0	333.82	1845.1	351.08	3009.46	37.87	safe
	Bhabra	990.82	0	233.03	1223.85	243.49	539.18	69.01	safe
	Jobat	1088.01	0	328.34	1416.35	374.66	594.97	68.83	safe
	Katthiwara	961.48	0	272.76	1234.25	285.62	1404.12	46.55	safe
	Sondwa	1392.79	0	500.44	1893.23	542.84	4386.16	29.95	safe
	Udaigarh	777.95	0	242.42	1020.37	251.73	1224.55	45.26	safe
	<b>DISTRICT TOTAL</b>	<b>6722.33</b>	<b>0</b>	<b>1910.8188</b>	<b>8633.15</b>	<b>2049.42</b>	<b>11158.44</b>	<b>43.32</b>	
<b>3</b>	<b>ANUPPUR</b>								
	Anuppur	102.384	43.3574	376.23762	521.97	390.82	6600.76	7.31	safe
	Jaithari	866.7	22.703	483.18408	1372.59	501.91	5652.29	19.49	safe
	Kotma	238.464	3237.259	146.13651	3621.86	151.8	954.19	79.05	semi_critical
	Pushparajgarh	276	0	556.90824	832.91	578.5	7376.61	10.12	safe
	<b>DISTRICT TOTAL</b>	<b>1483.548</b>	<b>3303.319</b>	<b>1562.46645</b>	<b>6349.33</b>	<b>1623.03</b>	<b>20583.85</b>	<b>23.52</b>	

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
<b>4</b>	<b>ASHOKNAGAR</b>								
	Ashoknagar	6149.95	1.37	551.49	6702.81	584.87	3261.14	67.05	safe
	Chanderi	4380.52	0.00	332.99	4713.50	353.54	1891.73	71.14	semi critical
	Isagarh	6219.37	0.00	425.10	6644.47	446.58	1752.49	78.93	semi critical
	Mungaoli	4631.56	0.04	514.64	5146.25	542.86	6608.32	43.68	safe
	<b>DISTRICT TOTAL</b>	<b>21381.39</b>	<b>1.41</b>	<b>1824.21</b>	<b>23207.03</b>	<b>1927.85</b>	<b>13513.68</b>	<b>63.02</b>	
<b>5</b>	<b>BALAGHAT</b>								
	Baihar	174.31	0.00	270.73	445.04	282.48	7968.87	5.28	safe
	Balaghat	1800.41	76.73	471.50	2348.65	491.97	7047.94	24.94	safe
	Birsa	113.22	72.16	324.16	509.54	338.23	9542.18	5.06	safe
	Katangi	2622.78	32.14	422.48	3077.41	440.83	2386.90	56.13	safe
	Khairlanji	1729.92	83.55	375.00	2188.49	391.28	1973.83	52.37	safe
	Kirnapur	1590.14	0.00	448.06	2038.19	467.52	4522.89	30.97	safe
	Lalbarra	1908.25	21.54	435.51	2365.30	454.41	4429.20	34.72	safe
	Lanji	1165.57	0.00	443.42	1608.99	462.67	6935.06	18.79	safe
	Paraswada	104.54	12.72	275.19	392.44	287.13	8065.40	4.63	safe
	Waraseoni	1448.07	102.09	385.14	1935.31	401.85	2000.23	48.97	safe
	<b>DISTRICT TOTAL</b>	<b>12657.22</b>	<b>400.93</b>	<b>3851.18</b>	<b>16909.36</b>	<b>4018.37</b>	<b>54872.50</b>	<b>23.5</b>	
<b>6</b>	<b>BARWANI</b>								
	Barwani	2851.35	3.36	504.31	3359.03	563.29	2937.88	52.85	safe
	Niwali	2152.68	0.00	342.29	2494.97	386.72	1130.77	67.98	safe

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
	Pansemal	8016.31	4.16	439.93	8460.39	476.48	716.92	138.33	over_exploited
	Pati	1209.16	0.00	538.36	1747.53	642.41	685.86	68.87	safe
	Rajpur	8415.54	6.19	593.53	9015.27	631.60	2382.07	87.95	semi_critical
	Sendhwa	3697.67	16.59	922.13	4636.38	1026.64	4108.72	52.39	safe
	Thikri	7034.58	7.70	387.30	7429.57	412.77	7077.32	52.11	safe
	<b>DISTRICT TOTAL</b>	<b>33377.29</b>	<b>37.99</b>	<b>3727.85</b>	<b>37143.14</b>	<b>4139.91</b>	<b>19039.54</b>	<b>71.38</b>	
<b>7</b>	<b>BETUL</b>								
	Amla	6927.71	17.52	483.38	7428.62	519.05	6699.93	52.45	safe
	Athner	2699.19	0.00	290.57	2989.75	310.86	2908.05	50.52	safe
	Betul	10499.72	50.05	423.17	10972.94	454.77	2464.18	81.47	semi_critical
	Bhainsdehi	3514.71	0.00	362.30	3877.02	381.74	5865.37	39.72	safe
	Bhimpur	2388.42	0.00	414.61	2803.03	445.38	6544.16	29.89	safe
	Chicholi	2469.61	0.00	209.47	2679.08	214.98	2345.50	53.26	safe
	Ghoda Dongri	2235.38	95.48	545.51	2876.39	553.93	10662.08	21.23	safe
	Multai	9583.08	2.37	369.65	9955.10	377.49	2066.97	82.75	semi_critical
	Prabhat Pattan	2070.82	1.75	316.90	2389.48	325.41	7907.62	23.19	safe
	Shahpur	2244.15	1.75	310.97	2556.89	333.91	1567.16	61.66	safe
	<b>DISTRICT TOTAL</b>	<b>44632.80</b>	<b>168.93</b>	<b>3726.52</b>	<b>48528.30</b>	<b>3917.52</b>	<b>49031.02</b>	<b>49.65</b>	
<b>8</b>	<b>BHIND</b>								
	Ater	4350.59	0.00	685.93	5036.51	723.61	8904.46	36.03	safe
	Bhind	3737.15	15.87	588.58	4341.59	620.90	8706.82	33.19	safe

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	Gohad	6221.57	84.63	644.78	6950.98	680.20	13453.80	34.01	safe
	Lahar	3751.92	0.00	487.43	4239.35	514.21	7331.98	36.55	safe
	Mehgaon	5384.97	148.38	809.47	6342.83	853.94	15642.18	28.79	safe
	Ron	2116.05	0.00	346.29	2462.36	365.31	6345.04	27.90	safe
	<b>DISTRICT TOTAL</b>	<b>25562.24</b>	<b>248.88</b>	<b>3562.49</b>	<b>29373.62</b>	<b>3758.17</b>	<b>60384.28</b>	<b>32.65</b>	
<b>9</b>	<b>BHOPAL</b>								
	Berasia	13569.12	53.50	852.31	14474.93	914.81	4653.39	75.43	semi_critical
	Bhopal Urban	0.00	31.38	3727.90	3759.27	4088.58	883.08	75.14	semi_critical
	Phanda	10347.26	601.53	529.92	11478.71	581.18	2224.93	83.45	semi_critical
	<b>DISTRICT TOTAL</b>	<b>23916.38</b>	<b>686.41</b>	<b>5110.13</b>	<b>29712.91</b>	<b>5584.57</b>	<b>7761.40</b>	<b>78.3</b>	
<b>10</b>	<b>BURHANPUR</b>								
	Burhanpur	11685.54	35.07	1144.95	12865.54	1233.65	4476.32	73.81	semi_critical
	Khaknar	10254.95	0.35	583.79	10839.09	625.49	5651.50	65.56	safe
	<b>DISTRICT TOTAL</b>	<b>21940.49</b>	<b>35.42</b>	<b>1728.73</b>	<b>23704.63</b>	<b>1859.14</b>	<b>10127.82</b>	<b>69.8</b>	
<b>11</b>	<b>CHHATARPUR</b>								
	Bada Malhera	6830.89	0.00	484.51	7315.39	518.66	4983.92	59.31	safe
	Bijawar	8775.70	0.00	250.33	9026.03	267.97	3630.61	71.22	semi_critical
	Buxwaha	4921.78	46.28	234.62	5202.69	251.16	1210.20	80.92	semi_critical
	Chhatarpur	6715.87	0.00	269.13	6985.01	288.10	2542.20	73.17	semi_critical
	Gaurihar	1617.67	0.00	484.90	2102.56	519.08	5065.84	29.19	safe
	Laundi	4840.99	0.00	451.52	5292.49	483.34	2751.13	65.54	safe

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	Nowgaon	6541.28	32.67	521.04	7094.98	557.76	1669.35	80.99	semi_critical
	Rajnagar	9494.47	0.73	409.21	9904.43	438.05	5945.21	62.38	safe
	<b>DISTRICT TOTAL</b>	<b>49738.65</b>	<b>79.68</b>	<b>3105.27</b>	<b>52923.58</b>	<b>3324.12</b>	<b>27798.46</b>	<b>65.42</b>	
<b>12</b>	<b>CHHINDWARA</b>								
	Amarwara	5772.45	28.5065	416.07	6217.02	438.23	3245.55	65.55	safe
	Bichhua	2800.4	0	222.23	3022.63	231.48	2960.44	50.44	safe
	Chaurai	7293	0	470.61	7763.61	487.04	3636.94	68.00	safe
	Chhindwara	8908.866	46.866	905.80	9861.54	964.01	56.32	99.43	critical
	Harrai	2799.44	0	371.73	3171.17	399.49	4798.49	39.65	safe
	Jamai	3360.24	169.2122	603.92	4133.37	627.12	7250.08	36.24	safe
	Mohkheda	7433.04	11.096	426.62	7870.76	444.37	2523.35	75.59	semi_critical
	Pandhurna	9126	32.2295	464.86	9623.09	477.07	1100.73	89.63	semi_critical
	Parasia	4029.2	284	752.21	5065.41	794.97	2625.61	65.50	safe
	Sausar	3500.53	8.5045	432.28	3941.32	441.96	3924.54	50.05	safe
	Tamia	719.16	0.14235	333.76	1053.06	369.24	3543.48	22.73	safe
	<b>DISTRICT TOTAL</b>	<b>55742.33</b>	<b>580.56</b>	<b>5400.10</b>	<b>61722.98</b>	<b>5674.98</b>	<b>35665.53</b>	<b>63.24</b>	
<b>13</b>	<b>DAMOH</b>								
	Batiyagarh	3981.27	276.05	424.67	4681.98	452.35	2570.87	64.31	safe
	Damoh	3344.21	4.72	227.99	3576.91	239.47	3903.32	47.74	safe
	Hatta	1528.29	0.00	323.19	1851.46	338.71	1122.20	61.94	safe
	Jabera	2146.34	0.00	269.25	2415.59	282.32	3264.09	42.43	safe

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	Patera	2390.13	0.00	43.90	2434.02	313.45	1050.00	64.85	safe
	Patharia	4153.84	18.25	423.42	4595.51	448.41	1090.36	80.47	semi_critical
	Tendulheda	1213.60	0.35	619.53	1833.46	660.47	1783.16	50.13	safe
	<b>DISTRICT TOTAL</b>	<b>18757.67</b>	<b>299.37</b>	<b>2331.94</b>	<b>21388.93</b>	<b>2735.18</b>	<b>14784.00</b>	<b>58.48</b>	
<b>14</b>	<b>DATIA</b>								
	Bhander	2910.54	0.00	419.51	3330.04	449.90	9749.48	25.40	safe
	Datia	2891.92	33.36	707.91	3633.20	759.20	3137.66	53.26	safe
	Seondha	6862.38	0.00	639.14	7501.53	685.44	12642.43	37.15	safe
	<b>DISTRICT TOTAL</b>	<b>12664.84</b>	<b>33.36</b>	<b>1766.56</b>	<b>14464.77</b>	<b>1894.54</b>	<b>25529.57</b>	<b>36.05</b>	
<b>15</b>	<b>DEWAS</b>								
	Bagli	13042.53	0.00	805.99	13848.53	855.76	6568.92	67.66	safe
	Dewas	15876.91	87.09	1259.80	17223.80	1331.89	0.00	110.88	over_exploited
	Kannod	6710.32	0.00	739.28	7449.59	808.99	5244.94	58.36	safe
	Khategaon	9620.96	0.00	536.63	10157.59	582.09	1843.87	84.32	semi_critical
	Sonkutch	9392.88	8.40	624.79	10026.07	654.93	0.00	103.20	over_exploited
	Tonkkhurd	5713.81	0.00	334.24	6048.05	345.93	4357.35	58.06	safe
	<b>DISTRICT TOTAL</b>	<b>60357.41</b>	<b>95.48</b>	<b>4300.72</b>	<b>64753.63</b>	<b>4579.59</b>	<b>18015.08</b>	<b>80</b>	
<b>16</b>	<b>DHAR</b>								
	Badnawar	18641.25	152.06	589.23	19382.55	619.43	569.05	122.33	over_exploited
	Bagh	1512.35	0.00	381.88	1894.22	438.19	4339.48	30.11	safe
	Dahi	2931.54	0.00	265.73	3197.27	276.03	5534.98	36.57	safe

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	Dhar	13965.98	242.25	528.76	14737.00	560.92	0.00	153.44	over_exploited
	Dharmपुरी	1649.03	0.51	494.65	2144.20	526.97	5170.43	29.18	safe
	Gandhwani	3093.28	71.87	426.65	3591.80	457.49	8813.61	28.88	safe
	Kukshi	1479.71	0.00	292.45	1772.16	309.15	3400.03	34.15	safe
	Manawar	2652.31	43.33	471.56	3167.20	505.39	6562.09	32.44	safe
	Nalchha	12053.99	124.26	895.06	13073.30	1086.24	192.12	116.30	over_exploited
	Nisarपुर	1931.36	0.00	234.51	2165.87	247.56	4267.80	33.60	safe
	Sardarपुर	7642.83	0.73	848.77	8492.34	929.18	9764.07	46.31	safe
	Tirla	7348.97	0.00	275.22	7624.19	303.22	321.57	95.62	critical
	Umarvan	1950.99	0.00	364.88	2315.87	388.63	6211.87	27.08	safe
	<b>DISTRICT TOTAL</b>	<b>76853.59</b>	<b>635.01</b>	<b>6069.37</b>	<b>83557.97</b>	<b>6648.40</b>	<b>55147.10</b>	<b>65.4</b>	
<b>17</b>	<b>DINDORI</b>								
	Amarपुर	161.70	0.00	204.14	365.83	219.38	2998.26	10.83	safe
	Bajang	124.03	0.00	235.41	359.43	252.99	2747.90	11.50	safe
	Dindori	325.00	0.00	365.52	690.52	392.81	5489.12	11.12	safe
	Karanjiya	247.15	0.00	238.69	485.83	256.51	4129.02	10.49	safe
	Menhadwani	223.60	0.00	227.27	450.87	244.24	3840.32	10.47	safe
	Samnapur	338.70	0.00	238.07	576.77	255.84	3731.84	13.33	safe
	Shahपुरा	896.00	0.00	339.32	1235.32	364.65	6018.77	16.97	safe
	<b>DISTRICT TOTAL</b>	<b>2316.18</b>	<b>0.00</b>	<b>1848.41</b>	<b>4164.57</b>	<b>1986.42</b>	<b>28955.23</b>	<b>12.52</b>	

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<b>18</b>	<b>GUNA</b>								
	Aron	7320.28	0.00	282.36	7602.64	294.11	3559.11	68.04	safe
	Bamori	9562.56	0.04	472.87	10035.47	507.97	5884.76	62.90	safe
	Chachaura	11841.61	0.00	538.47	12380.08	568.43	5370.40	69.63	safe
	Guna	9369.01	77.91	620.74	10067.66	668.77	4862.08	67.22	safe
	Raghogarh	9515.34	0.29	618.40	10134.04	676.70	7235.21	58.15	safe
	<b>DISTRICT TOTAL</b>	<b>47608.79</b>	<b>78.24</b>	<b>2532.84</b>	<b>50219.89</b>	<b>2715.98</b>	<b>26911.56</b>	<b>64.96</b>	
<b>19</b>	<b>GWALIOR</b>								
	Bhitarwar	4432.02	3.29	204.65	4639.95	219.12	19272.20	19.39	safe
	Dabra	3846.41	9.53	413.27	4269.21	416.97	16376.21	20.68	safe
	Ghatigaon	3020.75	163.07	600.77	3784.58	674.03	10302.21	26.73	safe
	Gwalior Urban	0.00	0.00	3795.16	3795.16	4189.31	744.59	76.92	semi_critical
	Morar	6752.97	94.90	470.52	7318.39	503.79	4752.37	60.46	safe
	<b>DISTRICT TOTAL</b>	<b>18052.15</b>	<b>270.78</b>	<b>5484.37</b>	<b>23807.29</b>	<b>6003.22</b>	<b>51447.58</b>	<b>31.42</b>	
<b>20</b>	<b>HARDA</b>								
	Harda	5920.56	0.00	427.92	6348.47	457.79	5527.96	53.32	safe
	Khirkiya	4082.40	0.00	406.70	4489.10	435.10	2094.83	67.89	safe
	Timarni	4402.08	16.17	409.38	4827.62	437.96	20572.77	18.98	safe
	<b>DISTRICT TOTAL</b>	<b>14405.04</b>	<b>16.17</b>	<b>1243.99</b>	<b>15665.19</b>	<b>1330.85</b>	<b>28195.56</b>	<b>35.65</b>	
<b>21</b>	<b>HOSHANGABAD</b>								
	Babai	2639.95	0.07	302.11	2942.12	316.11	26341.69	10.04	safe

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	Bankheddi	14575.68	0.00	322.81	14898.49	337.77	3396.62	81.37	semi_critical
	Hoshangabad	3787.56	2.33	257.27	4047.16	269.20	22960.66	14.98	safe
	Kesala	3772.22	10.76	281.04	4064.03	294.07	13113.77	23.64	safe
	Pipariya	7549.63	5.48	336.48	7891.57	352.08	12555.74	38.57	safe
	Seoni Malwa	3708.72	0.00	431.76	4140.47	451.77	36287.72	10.24	safe
	Shohagpur	4031.42	0.00	319.97	4351.39	334.80	6600.57	39.68	safe
	<b>DISTRICT TOTAL</b>	<b>40065.19</b>	<b>18.64</b>	<b>2251.42</b>	<b>42335.23</b>	<b>2355.80</b>	<b>121256.77</b>	<b>25.86</b>	
<b>22</b>	<b>INDORE</b>								
	Depalpur	23258.52	78.19	821.43	24158.13	877.35	201.51	142.82	over_exploited
	Indore	10715.89	200.43	689.62	11605.93	711.00	0.00	142.19	over_exploited
	Indore Urban	0.00	1016.90	4755.89	5772.79	5596.04	127.40	97.84	critical
	Mhow	7503.81	58.98	872.25	8435.06	901.88	2218.15	78.96	semi_critical
	Sawer	12943.35	146.34	731.32	13821.02	880.03	0.00	117.36	over_exploited
	<b>DISTRICT TOTAL</b>	<b>54421.57</b>	<b>1500.83</b>	<b>7870.51</b>	<b>63792.93</b>	<b>8966.30</b>	<b>2547.06</b>	<b>119.38</b>	
<b>23</b>	<b>JABALPUR</b>								
	Bargi	2356.56	0.00	574.91	2931.47	601.79	1763.70	62.08	safe
	Jabalpur Urban	0.00	85.98	2764.38	2850.36	3252.72	352.27	89.00	semi_critical
	Kundam	1025.00	0.00	317.38	1342.38	332.21	3097.62	30.13	safe
	Majholi	3066.34	0.07	401.31	3467.72	420.07	4341.07	44.30	safe
	Panagar	4706.16	16.50	608.95	5331.61	637.41	2652.75	66.54	safe
	Patan	5919.03	0.07	334.43	6253.53	350.06	8554.58	42.19	safe

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	Shahpura	5363.24	179.01	484.35	6026.59	506.99	3970.38	60.15	safe
	Sihora	2859.57	37.30	348.63	3245.51	364.93	4971.79	39.42	safe
	<b>DISTRICT TOTAL</b>	<b>25295.90</b>	<b>318.94</b>	<b>5834.34</b>	<b>31449.17</b>	<b>6466.18</b>	<b>29704.16</b>	<b>51.31</b>	
<b>24</b>	<b>JHABUA</b>								
	Jhabua	1261.68	0.07	442.22	1703.97	480.52	304.01	83.27	semi_critical
	Meghnagar	1285.38	0.00	566.79	1852.17	673.82	1162.44	59.33	safe
	Petlawad	2223.32	0.37	662.48	2886.16	749.20	7775.45	26.85	safe
	Rama	1143.03	0.00	365.45	1508.48	395.90	1034.77	58.61	safe
	Ranapur	806.09	0.00	290.63	1096.72	316.91	897.32	54.28	safe
	Thandla	1346.13	0.00	482.65	1828.78	531.50	1892.57	48.51	safe
	<b>DISTRICT TOTAL</b>	<b>8065.63</b>	<b>0.44</b>	<b>2810.21</b>	<b>10876.28</b>	<b>3147.85</b>	<b>13066.56</b>	<b>44.79</b>	
<b>25</b>	<b>KATNI</b>								
	Badwara	3517.47	56.91	558.08	4132.46	600.00	4120.68	49.82	safe
	Bahoriband	2345.63	266.73	547.49	3159.85	588.61	5132.99	37.92	safe
	Dhimar Kheda	1184.87	0.00	489.45	1674.32	526.22	3414.14	32.67	safe
	Murwara	3089.88	240.40	337.54	3667.82	362.89	3174.26	53.41	safe
	Rithi	1398.28	0.00	350.14	1748.40	376.43	1968.28	46.71	safe
	Vijayraghavgarh	2478.60	552.15	504.09	3534.83	541.96	2091.84	62.40	safe
	<b>DISTRICT TOTAL</b>	<b>14014.73</b>	<b>1116.18</b>	<b>2786.79</b>	<b>17917.68</b>	<b>2996.11</b>	<b>19902.19</b>	<b>47.12</b>	
<b>26</b>	<b>KHANDWA</b>								
	Baldi	3252	0	107.57	3359.56	108.13	2766.32	54.84	safe

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	Chhegaon Makhan	9858.76	16.9344	399.79	10275.48	421.29	1584.36	86.48	semi_critical
	Harsud	2598.09	0	192.37	2790.47	194.52	2396.6	53.77	safe
	Khalwa	6063.75	0	651.62	6715.37	721.56	4270.37	60.74	safe
	Khandwa	5993.55	33.653	510.44	6537.65	543.28	3332.73	66.02	safe
	Pandhana	8909.43	0	659.57	9569	718.86	6791.26	58.28	safe
	Punasa	3865.98	19.053	503.84	4388.87	536.28	40199.49	9.84	safe
	<b>DISTRICT TOTAL</b>	<b>40541.57</b>	<b>69.64</b>	<b>3025.19</b>	<b>43636.40</b>	<b>3243.92</b>	<b>61341.13</b>	<b>41.48</b>	
<b>27</b>	<b>KHARGONE</b>								
	Barwaha	7030.96	18.20	765.55	7814.71	804.77	12125.29	39.11	safe
	Bhagwanpura	2618.98	0.00	574.26	3193.23	641.27	3525.03	47.06	safe
	Bhikangaon	4819.26	7.26	523.37	5349.89	575.71	6500.64	44.95	safe
	Gogawan	2823.70	0.00	299.48	3123.18	307.74	2127.3	59.39	safe
	Jhiranya	3880.01	0.00	616.18	4496.18	698.15	3834.67	53.44	safe
	Kasrawad	5293.19	37.80	603.11	5934.1	640.53	11489.69	33.98	safe
	Khargone	4020.98	15.00	368.55	4404.52	382.95	1244.78	77.77	semi_critical
	Maheshwar	4640.64	0.00	538.56	5179.21	569.63	6429.16	44.50	safe
	Segaon	2598.22	0.00	229.02	2827.24	245.86	2200.49	56.05	safe
	<b>DISTRICT TOTAL</b>	<b>37725.95</b>	<b>78.26</b>	<b>4518.09</b>	<b>42322.26</b>	<b>4866.61</b>	<b>49477.05</b>	<b>45.93</b>	
<b>28</b>	<b>MANDLA</b>								
	Bichhiya	1137.38	0.00	397.08	1534.45	420.94	6252.74	19.64	safe
	Bijadandi	226.80	0.00	200.98	427.78	213.06	3523.35	10.79	safe

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	Ghughari	245.43	0.00	252.98	498.41	268.18	5591.22	8.16	safe
	Mandla	920.70	0.07	460.48	1381.24	488.16	2951.78	31.67	safe
	Mawai	942.84	0.00	262.78	1205.62	278.57	7691.87	13.53	safe
	Mohgaon	1057.86	0.00	206.80	1264.66	219.23	1155.93	51.98	safe
	Nainpur	1022.49	0.00	358.57	1381.07	380.13	5272.82	20.69	safe
	Narayanganj	720.90	0.00	228.33	949.23	242.05	1913.62	33.00	safe
	Niwas	733.86	0.00	169.96	903.82	180.17	2720.29	24.87	safe
	<b>DISTRICT TOTAL</b>	<b>7008.26</b>	<b>0.07</b>	<b>2537.96</b>	<b>9546.28</b>	<b>2690.49</b>	<b>37073.62</b>	<b>20.41</b>	
<b>29</b>	<b>MANDSAUR</b>								
	Bhanpura	5815.78	14.60	287.27	6117.66	299.12	1633.04	87.74	semi critical
	Garoth	11442.60	0.00	607.51	12050.12	666.28	1862.72	86.25	semi critical
	Malhargarh	8339.53	10.29	503.40	8853.23	519.99	1722.92	83.58	semi critical
	Mandsaur	16514.19	16.83	1049.67	17580.70	1078.86	550.08	115.25	over exploited
	Sitamau	20806.63	1.93	657.28	21465.84	680.50	832.30	130.97	over exploited
	<b>DISTRICT TOTAL</b>	<b>62918.73</b>	<b>43.65</b>	<b>3105.12</b>	<b>66067.55</b>	<b>3244.75</b>	<b>6601.06</b>	<b>104.57</b>	
<b>30</b>	<b>MORENA</b>								
	Ambah	3308.40	0.00	731.71	4040.11	773.60	2727.68	59.33	safe
	Jaora	2610.96	0.04	732.43	3343.43	762.38	6858.85	32.68	safe
	Kailaras	2291.76	1.83	593.64	2887.24	645.06	5051.59	36.13	safe
	Morena	3644.18	39.22	2100.47	5783.85	2349.05	6263.55	47.04	safe
	Pahadgarh	2388.36	0.00	432.03	2820.39	447.89	5786.91	32.71	safe

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	Porsa	2073.48	0.00	640.28	2713.76	673.14	3020.82	47.05	safe
	Sabalgarh	3646.03	45.26	650.46	4341.74	697.30	8508.22	33.67	safe
	<b>DISTRICT TOTAL</b>	<b>19963.18</b>	<b>86.34</b>	<b>5881.03</b>	<b>25930.52</b>	<b>6348.42</b>	<b>38217.62</b>	<b>40.13</b>	
<b>31</b>	<b>NARSINGHPUR</b>								
	Chawarpatha	14268.96	22.05	418.30	14709.30	437.08	6756.73	68.46	safe
	Chichli	10272.96	17.74	409.62	10700.32	428.01	6876.80	60.81	safe
	Gotegaon	11364.84	0.07	432.45	11797.36	451.85	7721.19	60.38	safe
	Kareli	12840.77	18.76	333.12	13192.65	348.08	6884.86	65.66	safe
	Narsinghpur	15827.18	65.70	410.95	16303.84	429.39	4825.65	77.09	semi_critical
	Saikheda	8373.24	75.34	343.15	8791.73	358.55	4096.53	68.13	safe
	<b>DISTRICT TOTAL</b>	<b>72947.95</b>	<b>199.66</b>	<b>2347.59</b>	<b>75495.20</b>	<b>2452.96</b>	<b>37161.76</b>	<b>66.95</b>	
<b>32</b>	<b>NEEMUCH</b>								
	Jawad	11348.32	29.04	531.70	11909.05	550.16	351.17	109.45	over_exploited
	Manasa	8556.62	0.00	432.64	8989.26	453.11	2292.02	79.54	semi_critical
	Neemuch	14168.04	0.81	804.71	14973.57	842.93	203.31	107.22	over_exploited
	<b>DISTRICT TOTAL</b>	<b>34072.98</b>	<b>29.85</b>	<b>1769.05</b>	<b>35871.88</b>	<b>1846.20</b>	<b>2846.50</b>	<b>99.23</b>	
<b>33</b>	<b>NIWARI</b>								
	Niwari	4223.75	5.79	614.53	4844.07	739.91	1934.24	70.17	semi_critical
	Prithvipur	7296.37	0.00	515.84	7812.22	599.40	3320.64	69.65	safe
	<b>DISTRICT TOTAL</b>	<b>11520.12</b>	<b>5.79</b>	<b>1130.38</b>	<b>12656.29</b>	<b>1339.31</b>	<b>5254.88</b>	<b>69.85</b>	
<b>34</b>	<b>PANNA</b>								

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	Ajaigarh	6176.12	0.00	396.72	6572.84	421.98	9868.62	39.92	safe
	Gunnor	1713.24	17.31	638.02	2368.57	678.64	3324.67	41.31	safe
	Panna	3066.77	17.31	453.40	3537.48	482.26	8230.81	29.99	safe
	Pawai	3015.10	175.97	492.65	3683.72	524.01	6140.80	37.38	safe
	Shahnagar	1799.77	0.35	497.03	2297.14	528.68	4419.09	34.04	safe
	<b>DISTRICT TOTAL</b>	<b>15770.99</b>	<b>210.94</b>	<b>2477.82</b>	<b>18459.75</b>	<b>2635.57</b>	<b>31983.99</b>	<b>36.48</b>	
<b>35</b>	<b>RAISEN</b>								
	Badi	2998.19	0.00	598.06	3596.25	636.49	19066.25	15.84	safe
	Begamganj	5676.89	0.07	332.17	6009.13	358.32	4108.85	59.24	safe
	Gairatganj	4768.85	0.00	363.12	5131.96	399.15	2811.93	64.31	safe
	Obedullaganj	7085.23	313.54	782.05	8180.82	896.00	893.08	89.04	semi_critical
	Sanchi	7326.50	234.57	489.16	8050.23	520.80	5119.08	60.98	safe
	Silwani	8349.97	0.00	412.58	8762.53	437.71	3960.19	68.74	safe
	Udaipura	6422.33	0.00	440.67	6863.00	479.05	3950.91	63.24	safe
	<b>DISTRICT TOTAL</b>	<b>42627.95</b>	<b>548.18</b>	<b>3417.80</b>	<b>46593.92</b>	<b>3727.52</b>	<b>39910.29</b>	<b>53.67</b>	
<b>36</b>	<b>RAJGARH</b>								
	Biaora	14439.25	0.01	649.85	15089.10	711.12	1884.19	88.58	semi_critical
	Jirapur	9166.28	0.04	450.63	9616.96	487.76	2575.94	78.63	semi_critical
	Khilchipur	9520.30	0.00	407.89	9928.19	436.01	1102.74	89.77	semi_critical
	Narsinghgarh	15275.52	0.36	1217.55	16493.43	1380.34	77.50	98.56	critical
	Rajgarh	11166.98	0.75	535.02	11702.77	576.66	4296.85	72.95	semi_critical

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	Sarangpur	13983.03	10.42	859.82	14853.27	943.01	0.00	110.63	over_exploited
	<b>DISTRICT TOTAL</b>	<b>73551.37</b>	<b>11.57</b>	<b>4120.76</b>	<b>77683.72</b>	<b>4534.90</b>	<b>9937.22</b>	<b>89.78</b>	
<b>37</b>	<b>RATLAM</b>								
	Alot	17444.85	2.59	695.15	18142.59	806.35	0.00	119.39	over_exploited
	Bajna	4759.65	0.04	562.99	5322.69	655.41	1512.93	86.89	semi_critical
	Jaora	24937.40	0.37	399.40	25337.17	440.24	0.00	170.51	over_exploited
	Piploda	18918.37	0.00	371.64	19290.01	395.68	0.00	169.54	over_exploited
	Ratlam	29132.62	34.24	1984.20	31151.06	3255.08	0.00	131.33	over_exploited
	Sailana	4245.42	0.15	436.74	4682.29	513.34	864.92	83.26	semi_critical
	<b>DISTRICT TOTAL</b>	<b>99438.31</b>	<b>37.38</b>	<b>4450.12</b>	<b>103925.81</b>	<b>6066.10</b>	<b>2377.85</b>	<b>135.14</b>	
<b>38</b>	<b>REWA</b>								
	Gangev	2404.20	20.74	299.80	2724.74	309.33	1392.43	66.03	safe
	Hanumana	1419.28	5.18	771.04	2195.50	840.65	4404.14	32.92	safe
	Jawa	2407.92	0.00	610.44	3018.36	665.55	4683.96	38.91	safe
	Mauganj	2234.20	3.88	536.92	2775.00	584.59	880.32	74.94	semi_critical
	Naigarhi	1506.09	6.24	206.83	1719.16	220.92	769.71	68.69	safe
	Rampur Karchuliyani	2413.91	16.85	822.50	3253.25	905.72	1337.29	69.61	safe
	Rewa	2613.22	68.04	1044.54	3725.80	1150.13	1593.55	68.68	safe
	Sirmour	2868.50	51.84	646.23	3566.58	703.49	1584.60	68.48	safe
	Teonthar	3504.87	12.96	730.33	4248.16	804.67	5431.99	43.55	safe
	<b>DISTRICT TOTAL</b>	<b>21372.19</b>	<b>185.73</b>	<b>5668.63</b>	<b>27226.55</b>	<b>6185.05</b>	<b>22077.99</b>	<b>54.65</b>	

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
<b>39</b>	<b>SAGAR</b>								
	Banda	5623.62	35.84	282.53	5941.99	286.19	4277.60	58.12	safe
	Bina	7572.91	0.91	334.44	7908.26	342.91	4055.90	66.05	safe
	Deori	4754.05	0.00	359.29	5113.35	369.09	3272.93	60.90	safe
	Jaisinagar	6224.80	0.00	259.25	6484.05	274.51	3596.88	64.22	safe
	Kesli	6003.29	0.00	330.18	6333.47	347.62	3578.70	63.78	safe
	Khurai	4419.53	0.11	539.16	4958.80	673.37	3617.58	56.93	safe
	Malthon	3140.00	0.00	419.80	3559.80	450.54	3375.16	51.10	safe
	Rahatgarh	5269.76	11.50	273.19	5554.45	289.27	3639.70	60.31	safe
	Rehli	3669.14	20.49	272.88	3962.51	275.66	2843.32	58.20	safe
	Sagar	7349.35	11.92	403.44	7764.71	427.19	6199.48	55.51	safe
	Shahnagar	2780.49	0.00	333.76	3114.27	353.41	2936.59	51.30	safe
	<b>DISTRICT TOTAL</b>	<b>56806.95</b>	<b>80.78</b>	<b>3807.91</b>	<b>60695.66</b>	<b>4089.76</b>	<b>41393.84</b>	<b>59.29</b>	
<b>40</b>	<b>SATNA</b>								
	Amarpatan	5269.49	30.80	552.80	5853.09	588.78	1930.96	74.85	semi_critical
	Maiihar	3888.00	1038.01	857.47	5783.49	913.30	741.08	87.89	semi_critical
	Majhgawan	4160.70	15.50	633.90	4810.11	675.17	7446.05	39.11	safe
	Nagod	6986.37	0.00	564.83	7551.21	601.61	3405.45	68.69	safe
	Ramnagar	1863.00	0.00	429.13	2292.14	457.07	3300.54	40.78	safe
	Rampur-Baghelan	6863.08	0.00	685.19	7548.26	729.80	2889.86	89.32	semi_critical
	Sohawal	6310.48	0.00	579.22	6889.72	616.93	2361.13	74.17	semi_critical

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
	Unchehara	4077.26	0.00	464.41	4541.67	494.65	3395.01	57.01	safe
	<b>DISTRICT TOTAL</b>	<b>39418.38</b>	<b>1084.31</b>	<b>4766.96</b>	<b>45269.69</b>	<b>5077.31</b>	<b>25470.08</b>	<b>65.59</b>	
<b>41</b>	<b>SEHORE</b>								
	Ashta	11648.57	59.00	619.90	12327.47	664.38	812.47	93.50	critical
	Budni	3462.13	31.06	210.12	3703.30	222.39	6684.17	35.61	safe
	Ichhawar	4846.42	5.89	410.86	5263.17	434.86	2381.73	68.63	safe
	Nasrullaganj	5470.09	0.00	464.35	5934.46	514.43	7236.94	44.88	safe
	Sehore	13628.06	21.51	821.88	14471.47	878.91	8491.55	62.86	safe
	<b>DISTRICT TOTAL</b>	<b>39055.28</b>	<b>117.47</b>	<b>2527.11</b>	<b>41699.87</b>	<b>2714.97</b>	<b>25606.86</b>	<b>61.78</b>	
<b>42</b>	<b>SEONI</b>								
	Barghat	3089.84	0.00	495.16	3585.00	525.57	2931.59	54.76	safe
	Chhapara	3978.72	1.39	328.26	4308.37	348.40	1857.93	69.64	safe
	Dhanora	1079.60	0.00	226.98	1306.57	240.90	3221.24	28.77	safe
	Ghansaur	1337.25	0.00	380.66	1717.91	404.01	4963.62	25.62	safe
	Keolari	1259.85	0.00	422.15	1682.00	448.05	4792.06	25.88	safe
	Kurai	3042.42	0.00	311.91	3354.33	331.04	10309.37	24.51	safe
	Lakhnadon	4675.74	0.00	509.24	5184.98	540.47	8671.65	37.33	safe
	Seoni	6501.38	3.52	654.16	7159.08	694.28	3143.62	69.22	safe
	<b>DISTRICT TOTAL</b>	<b>24964.82</b>	<b>4.91</b>	<b>3328.53</b>	<b>28298.24</b>	<b>3532.72</b>	<b>39891.08</b>	<b>41.38</b>	
<b>43</b>	<b>SHAHDOL</b>								
	Beohari	920.72	0.00	497.57	1418.29	526.25	4886.60	22.39	safe

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
	Burhar	220.32	750.95	536.56	1507.84	567.49	11649.02	11.43	safe
	Gohparu	227.45	0.00	285.98	513.43	302.47	9331.59	5.21	safe
	Jaisinghnagar	1108.08	0.00	492.06	1600.14	520.43	14023.39	10.22	safe
	Sohagpur	648.00	922.36	495.28	2065.63	523.83	6043.31	25.38	safe
	<b>DISTRICT TOTAL</b>	<b>3124.57</b>	<b>1673.31</b>	<b>2307.45</b>	<b>7105.33</b>	<b>2440.47</b>	<b>45933.91</b>	<b>13.36</b>	
<b>44</b>	<b>SHAJAPUR</b>								
	Kalapipal	14205.13	34.60	448.02	14687.76	471.53	0.00	110.83	over_exploited
	Moman Badodiya	16232.72	0.07	456.44	16689.23	476.09	0.00	126.69	over_exploited
	Shajapur	9359.10	18.97	657.14	10035.22	689.10	2116.74	82.36	semi_critical
	Shujalpur	12985.88	0.91	620.46	13607.25	651.81	0.00	105.82	over_exploited
	<b>DISTRICT TOTAL</b>	<b>52782.83</b>	<b>54.55</b>	<b>2182.07</b>	<b>55019.46</b>	<b>2288.53</b>	<b>2116.74</b>	<b>106.9</b>	
<b>45</b>	<b>SHEOPUR</b>								
	Karahal	6087.84	0.00	348.33	6436.17	380.20	5746.47	52.69	safe
	Sheopur	5433.55	44.79	803.85	6282.19	864.40	22682.02	21.64	safe
	Vijaypur	6109.95	0.00	665.64	6775.59	723.91	2601.43	71.81	semi_critical
	<b>DISTRICT TOTAL</b>	<b>17631.34</b>	<b>44.79</b>	<b>1817.82</b>	<b>19493.95</b>	<b>1968.51</b>	<b>31029.92</b>	<b>38.47</b>	
<b>46</b>	<b>SHIVPURI</b>								
	Badarwas	8777.23	0.00	530.60	9307.83	573.80	1940.52	82.43	semi_critical
	Karera	3220.77	38.33	674.07	3933.17	728.96	3602.49	51.82	safe
	Khaniyadhana	7047.36	0.00	691.95	7739.32	748.29	1436.36	83.83	semi_critical
	Kolaras	6830.25	0.00	431.41	7261.65	466.53	2509.34	74.05	semi_critical

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	Narwar	5787.07	0.00	576.87	6363.94	623.84	2048.23	75.23	semi_critical
	Pichhore	5053.19	0.00	577.58	5630.77	624.61	1633.73	77.01	semi_critical
	Pohari	5650.17	0.00	663.88	6314.05	717.94	6320.02	49.76	safe
	Shivpuri	5922.63	4.66	522.35	6449.66	564.88	5448.74	54.01	safe
	<b>DISTRICT TOTAL</b>	<b>48288.67</b>	<b>42.99</b>	<b>4668.71</b>	<b>53000.39</b>	<b>5048.85</b>	<b>24939.43</b>	<b>67.67</b>	
<b>47</b>	<b>SIDHI</b>								
	Kusmi	1723.68	0.00	227.33	1951.01	246.81	6011.03	24.44	safe
	Majholi	1520.64	0.00	428.76	1949.40	465.49	3512.52	35.45	safe
	Rampur Naikin	1575.08	87.92	657.25	2320.27	713.55	4499.65	33.74	safe
	Sidhi	2061.29	0.34	838.43	2900.05	910.25	1312.22	67.69	safe
	Sihawal	671.72	0.00	756.61	1428.32	821.42	3078.66	31.24	safe
	<b>DISTRICT TOTAL</b>	<b>7552.41</b>	<b>88.26</b>	<b>2908.38</b>	<b>10549.05</b>	<b>3157.52</b>	<b>18414.08</b>	<b>36.11</b>	
<b>48</b>	<b>SINGRAULI</b>								
	Chitrangi	1744.20	622.00	1010.76	3376.97	1118.73	4606.24	41.74	safe
	Deosar	2747.25	150.54	931.34	3829.13	1035.43	8338.24	31.20	safe
	Waidhan	4488.31	1447.15	715.19	6650.67	791.59	8367.44	44.06	safe
	<b>DISTRICT TOTAL</b>	<b>8979.76</b>	<b>2219.69</b>	<b>2657.30</b>	<b>13856.77</b>	<b>2945.75</b>	<b>21311.92</b>	<b>39.08</b>	
<b>49</b>	<b>TIKAMGARH</b>								
	Baldeogarh	5778.65	0.00	579.69	6358.33	703.73	2069.71	74.35	semi_critical
	Jatara	8723.26	0.00	830.15	9553.40	956.48	1247.28	87.43	semi_critical
	Palera	4747.60	0.00	794.29	5541.90	922.50	1095.86	81.91	semi_critical

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
	Tikamgarh	7484.68	0.00	869.89	8354.56	1163.81	1535.29	82.04	semi_critical
	<b>DISTRICT TOTAL</b>	<b>26734.19</b>	<b>0.00</b>	<b>3074.02</b>	<b>29808.19</b>	<b>3746.52</b>	<b>5948.14</b>	<b>81.83</b>	
<b>50</b>	<b>UJJAIN</b>								
	Badnagar	25427	0.00438	647.47	26074.47	678.79	0	137.03	over_exploited
	Ghatia	15288	7.15	366.51	15661.65	387.34	0	128.97	over_exploited
	Khchrod	12659.4	3.3945	800.09	13462.89	837.35	4959.15	72.93	semi_critical
	Mahidpur	13005.17	0	641.98	13647.14	683.45	2388.17	84.89	semi_critical
	Tarana	10500.6	18.19379	594.87	11113.67	619.41	1651.87	86.89	semi_critical
	Ujjain	18605.76	29.03	844.66	19479.45	897.88	0	151.30	over_exploited
	<b>DISTRICT TOTAL</b>	<b>95485.93</b>	<b>57.77</b>	<b>3895.58</b>	<b>99439.27</b>	<b>4104.22</b>	<b>8999.19</b>	<b>108.83</b>	
<b>51</b>	<b>UMARIA</b>								
	Karkeli	1524.10	359.71	674.79	2558.59	736.45	6479.50	28.12	safe
	Manpur	2423.52	0.23	651.29	3075.04	710.81	14423.24	17.51	safe
	Pali	347.33	180.13	245.28	772.73	267.70	6786.65	10.19	safe
	<b>DISTRICT TOTAL</b>	<b>4294.94</b>	<b>540.07</b>	<b>1571.36</b>	<b>6406.36</b>	<b>1714.96</b>	<b>27689.39</b>	<b>18.71</b>	
<b>52</b>	<b>VIDISHA</b>								
	Basoda	8286.61	0.07	839.08	9125.75	931.30	3919.32	69.46	safe
	Gyaraspur	7450.06	0.15	322.01	7772.20	337.91	3272.00	70.27	semi_critical
	Kurwai	8092.22	0.00	354.27	8446.49	357.01	2694.41	75.80	semi_critical
	Lateri	4304.79	0.00	427.75	4732.54	471.70	3718.65	55.71	safe
	Nateran	6042.86	0.00	498.56	6541.43	524.50	3849.35	62.80	safe

S N	Assessment Unit Name	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization
	Sironj	8429.67	0.19	654.33	9084.19	702.31	4490.82	66.68	safe
	Vidisha	8439.80	13.52	873.72	9327.03	935.81	8178.85	53.09	safe
	<b>DISTRICT TOTAL</b>	<b>51046.00</b>	<b>13.93</b>	<b>3969.72</b>	<b>55029.63</b>	<b>4260.54</b>	<b>30123.40</b>	<b>64.4</b>	
	<b>STATE TOTAL (Ham)</b>	<b>1740325.6</b>	<b>17460.5</b>	<b>172240.36</b>	<b>1930026.51</b>	<b>187742.3</b>	<b>1445041.6</b>	<b>58.75</b>	
	<b>STATE TOTAL (bcm)</b>	<b>17.40</b>	<b>0.17</b>	<b>1.72</b>	<b>19.30</b>	<b>1.88</b>	<b>14.45</b>	<b>58.75</b>	

## Annexure V: Categorisation of Assessment Unit, 2023

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	AGAR MALWA	1	Badod			1	Nalkheda
						2	Susner
2	ANUPPUR	1	Kotma				
3	ASHOKNAGAR	1	Isagarh				
		2	Chanderi				
4	BARWANI	1	Rajpur			1	Panseml
5	BETUL	1	Betul				
		2	Multai				
6	BHOPAL	1	Berasia				
		2	Bhopal Urban				
		3	Phanda				
7	BURHANPUR	1	Burhanpur				
8	CHHATARPUR	1	Buxwaha				
		2	Chhatarpur				
		3	Bijawar				
		4	Nowgaon				
9	CHHINDWARA	1	Mohkheda	1	Chhindwara		
		2	Pandhurna				
10	DAMOH	1	Patharia				
11	DEWAS	1	Khategaon			1	Sonkutch
						2	Dewas
12	DHAR			1	Tirla	1	Nalchha
						2	Dhar
						3	Badnawar
13	GWALIOR	1	Gwalior Urban				

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
14	<b>HOSHANGABAD</b>	1	Bankhedi				
15	<b>INDORE</b>	1	Mhow	1	Indore Urban	1	Depalpur
						2	Indore
						3	Sawer
16	<b>JABALPUR</b>	1	Jabalpur Urban				
17	<b>JHABUA</b>	1	Jhabua				
18	<b>KHANDWA</b>	1	Chhegaon Makhan				
19	<b>KHARGONE</b>	1	Khargone				
20	<b>MANDSAUR</b>	1	Malhargarh			1	Mandsaur
		2	Bhanpura			2	Sitamau
		3	Garoth				
21	<b>NARSINGHPUR</b>	1	Narsinghpur				
22	<b>NEEMUCH</b>	1	Manasa			1	Neemuch
						2	Jawad
23	<b>NIWARI</b>	1	Niwari				
24	<b>RAISEN</b>	1	Obedullaganj				
25	<b>RAJGARH</b>	1	Rajgarh	1	Narsinghgarh	1	Sarangpur
		2	Biaora				
		3	Jirapur				
		4	Khilchipur				
26	<b>RATLAM</b>	1	Sailana			1	Alot
		2	Bajna			2	Ratlam
						3	Piploda
						4	Jaora
27	<b>REWA</b>	1	Mauganj				

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
28	SATNA	1	Rampur-Baghelan				
		2	Maiihar				
		3	Amarpatan				
		4	Sohawal				
29	SEHORE			1	Ashta		
30	SHAJAPUR	1	Shajapur			1	Kalapipal
						2	Moman Badodiya
						3	Shujalpur
31	SHEOPUR	1	Vijaypur				
32	SHIVPURI	1	Badarwas				
		2	Kolaras				
		3	Pichhore				
		4	Khaniyadhana				
		5	Narwar				
33	TIKAMGARH	1	Palera				
		2	Baldeogarh				
		3	Jatara				
		4	Tikamgarh				
34	UJJAIN	1	Tarana			1	Ghatia
		2	Mahidpur			2	Badnagar
		3	Khchrod			3	Ujjain
35	VIDISHA	1	Gyaraspur				
		2	Kurwai				
<b>ABSTRACT</b>							
<b>Total No. of Assessed Units</b>		<b>Number of Semicritical Assessment Units</b>		<b>Number of Critical Assessment Units</b>		<b>Number of Over Exploited Assessment Units</b>	
317		60		5		26	

**Annexure VI: Quality Tagging**

S.N.	Name of District	S.N.	Name of Assessment Units affected by Fluoride	S.N.	Name of Assessment Units affected by Arsenic	S.N.	Name of Assessment Units affected by Salinity
1	<b>ALIRAJPUR</b>	1	Alirajpur				
2	<b>BHIND</b>					1	Mehgaon
						2	Gohad
3	<b>CHHINDWARA</b>	1	Mohkheda				
		2	Chhindwara				
		3	Parasia				
		4	Bichhua				
		5	Chaurai				
		6	Tamia				
		7	Sausar				
		8	Jamai				
		9	Amarwara				
		10	Pandhurna				
4	<b>DHAR</b>	1	Tirla				
		2	Nalchha				
		3	Umarvan				
		4	Manawar				
		5	Dhar				
		6	Badnawar				
		7	Bagh				
		8	Gandhwani				
		9	Nisarpur				
		10	Sardarpur				
		11	Dahi				
		12	Dharpuri				
5	<b>JHABUA</b>	1	Jhabua				
		2	Ranapur				
		3	Petlawad				
		4	Rama				
		5	Thandla				
6	<b>MANDLA</b>	1	Mohgaon				
		2	Ghughari				
		3	Mandla				

S.N.	Name of District	S.N.	Name of Assessment Units affected by Fluoride	S.N.	Name of Assessment Units affected by Arsenic	S.N.	Name of Assessment Units affected by Salinity
7	<b>RATLAM</b>	1	Sailana				
		2	Bajna				
8	<b>SEHORE</b>	1	Ashta				
		2	Sehore				
		3	Nasrullaganj				
		4	Ichhawar				
9	<b>SEONI</b>	1	Ghansaur				
		2	Kurai				
		3	Chhapara				
		4	Seoni				
		5	Keolari				
		6	Barghat				
10	<b>SHAJAPUR</b>	1	Kalapipal				
		2	Moman Badodiya				
		3	Shajapur				
		4	Shujalpur				
11	<b>VIDISHA</b>	1	Vidisha				
<b>ABSTRACT</b>							
<b>Total No. of Assessed Units</b>		<b>Number of Assessment Units affected by Fluoride</b>		<b>Number of Assessment Units affected by Arsenic</b>		<b>Number of Assessment Units affected by Salinity</b>	
50		48		0		2	

**Appendix-A: Government Resolution on constitution of Permanent Central Level Expert Group (CLEG) for overall re-assessment of Ground Water Resources of the country, (as in 2023)**

(TO BE PUBLISHED IN THE GAZETTE OF INDIA PART-I, SECTION -I)

No. T-13014/1/2019-GW Section  
 Government of India  
 Ministry of JAL SHAKTI  
 Department of Water Resources, River Development & Ganga Rejuvenation  
 \*\*\*\*\*

Shram Shakti Bhavan, Rafi Marg,  
 New Delhi, Dated: 08.02.2022

**RESOLUTION**

**Sub: Constitution of Central Level Expert Group (CLEG) for periodic re-assessment of ground water resources of the country.**

The State-wise annual assessment of Dynamic Ground Water Resources for the entire country are made based on the methodology and norms recommended by Ground Water Resources Estimation Committee (GEC) 1997 and 2015. There are changes in ground water scenario in various parts of the country because of various interventions by Government/public. Groundwater being a dynamic resource, its periodic assessment in the country can help the policy makers/planners to take suitable timely intervention for sustainable management of this precious resource. Accordingly, a Central Level Expert Group (CLEG) is hereby constituted for over-all supervision of the assessment of ground water resources in the entire country for each Water Year. The composition and Terms of Reference of the Expert Group are as follows:-

**1. Composition:**

S.No	Designation and Name of Department	Committee
1.	Chairman, CGWB	<b>Chairman</b>
2.	Member(RM), CWC	<b>Member</b>
3.	Member (CGWA), CGWB	<b>Member</b>
4.	Director, NIH, Roorkee or representative	<b>Member</b>
5.	Joint Secretary, Ministry of Agriculture & Farmer Welfare or his nominee.	<b>Member</b>
6.	Joint Secretary, Department of Drinking Water Supply & Sanitation, Ministry of Jal Shakti or his nominee.	<b>Member</b>
7.	Joint Secretary, Ministry of Housing and Urban Affairs or his nominee.	<b>Member</b>
8.	Representative of Department of Civil Engg., Indian Institute of Technology-Hyderabad	<b>Member</b>
9.	Member(South), CGWB	<b>Member Secretary</b>

2022/GW Section

T-13014/1/2019-GW Section

Ordered that a copy of the Resolution published be communicated to this Ministry for record.

  
(Ashish Kumar)  
Director (GW)

To  
The Manager,  
Government of India Press,  
Faridabad (Haryana).

आशीष कुमार/ASHISH KUMAR  
निदेशक/Director  
जल संसाधन, नदी विकास एवं गंगा संवर्धन विभाग  
Ministry of Water Resources, River Development  
& Ganga Rejuvenation  
संघ शासन/Govt. of India  
नई दिल्ली/New Delhi-110001.

Copy to:

1. PS to Minister (JAL SHAKTI)
2. PS to MoS (JAL SHAKTI)
3. PS to MoS (JAL SHAKTI)
4. Sr PPS to Secretary (DoWR, RD & GR)
5. PPS to Joint Secretary (IC & GW)
6. All members concerned.
7. Chairman, CGWB, Faridabad.
8. Member (S), CGWB and Member Secretary of the CLEG, CGWB, CHQ, Faridabad for information and necessary action.

Copy also to:

NIC for uploading the Resolution on Ministry's website.

**Appendix-B: Constitution of Permanent State Level Committee(as in 2023)**

**Government of Madhya Pradesh  
Water Resources Department  
Mantralaya  
Vallabh Bhawan, Bhopal**

**ORDER**

Memo No. F-15-21/Minor/31/2020 Bhopal dated 16/02/2022

**Subject:-**Assessment of Annual Ground Water Resources-constitution of State Level Committee for re-assessment of ground water resources.

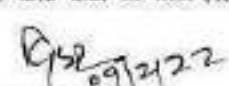
2. The last assessment of ground water resources for the state was made in the year 2020 based on the Methodology adopted by the Ground Water Resources Estimation Committee-2015. With a view to re-assess the ground water resources for the year 2022 as well as in future, the State Level Committee is constituted as under :-

i. Additional Chief secretary/ Principal Secretary WRD	Chairman
ii. Commissioner, Urban Development and Housing Department	Member
iii. Commissioner, MNREGA, Bhopal	Member
iv. Director, Rajeev Gandhi Water Shed Mission	Member
v. General Manager, NABARD, Bhopal	Member
vi. Engineer-in-Chief, Water Resources Department	Member
vii. Engineer-in-Chief, Public health & Engineering Department	Member
viii. Engineer-in-Chief, RES	Member
ix. Director, Agriculture	Member
x. Director, Directorate Geology & Mining, Bhopal	Member
xi. Director, Industries	Member
xii. Chief Engineer, BODHI, Water Resources Department	Member
xiii. Superintending Geo-Hydrologist, GWSC, Circle Bhopal	Member
xiv. Regional Director, CGWB	Member Secretary

3. The committee may co-opt any other Member(s)/special invitee(s), if necessary. The broad terms of reference of the Committee would be as follow:-

- i. To estimate Annual replenishable ground water resources of the state in accordance with the Ground Water Resources Estimation Methodology.
- ii. To estimate the status of utilization of the annual replenishable ground water resources.

The Committee will submit its report within six months from the date of its constitution. 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 Water Resources Department.

  
 (V.S. Tekam)  
 Deputy Secretary,  
 Govt. of M.P. Water Resources Deptt.

Endt. No. F-15-21/Minor/31/291

Bhopal, Dated 10/02/2022

Copy forward to:-

1. OSD, Hon'ble Minister/ State Minister, Govt. of MP, Water Resources Department, Bhopal.
2. P. A. to Additional chief Secretary, Govt. of MP, Water Resources Department, Bhopal.
3. Commissioner, Urban Development and Housing Department, Bhopal.
4. Commissioner, MNREGA, Bhopal
5. Director, Rajiv Gandhi Water Shed Mission, Bhopal.
6. General Manager, NABARD
7. Engineer-in-Chief, Water Resources Department, Bhopal.
8. Engineer-in-Chief, Public health & Engineering Department, Bhopal.
9. Engineer-in-Chief, RES, Bhopal.
10. Director, Agriculture, Govt. of MP, Bhopal.
11. Director, Industries, Govt. of MP, Bhopal.
12. Director, Directorate Geology & Mining, Bhopal
13. Chief Engineer, BODHI, Water Resources Department, Bhopal.
14. Superintending Geo-Hydrologist, GWSC, Circle Bhopal.
15. Regional Director, CGWB, Paryawas Bhawan, Bhopal.

For information and necessary action.

*[Handwritten Signature]*  
09/2/22

**Deputy Secretary,**  
**Govt. of M.P. Water Resources Deptt.**

## Appendix-C: Minutes of First State Level Committee Meeting

### Minutes of First meeting of State Level Committee (SLC) for "Ground Water Resources Estimation-2023" held on 19.04.2023

The meeting of the first State Level Committee for Ground Water Resources Estimation-2023 was held in the Hall no. E-211, VB-3, Vallabh Bhawan, Bhopal on 19<sup>th</sup> April, 2023 at 15:00 hrs. The meeting was chaired by Sh. S N Misra, Additional Chief Secretary, Water Resources Department, Govt of Madhya Pradesh. The meeting was attended by committee members from Urban Development and Housing Department, MGNREGA, Rajeev Gandhi Water Shed Mission, National Bank for Agriculture and Rural Development, Water Resource Department, Public Health Engineering Department, Directorate Geology and Mining, Madhya Pradesh Industrial Development Corporation and Madhya Pradesh Pollution Control Board. The list of officers attended the meeting is enclosed in Annexure-I.

Sh. A K Biswal, Regional Director, CGWB, NCR, Bhopal welcomed all the Members of State Level Committee and participants. With permission of chair, a presentation on "Overview of Ground Water Resource Estimation, Strategic Plan and Status of various activities related to Ground Water Resource Estimation -2023" was made by Sh. Chittaranjan Biswal, Scientist-C, CGWB, NCR, Bhopal.

The presentations were followed by detailed discussions on various aspects of the resource assessment of 2023.

Important action points emerged from the discussions are listed below:

- Ground Water quality tagging of the Ground water quality deteriorated assessment units on the basis of Public Health and Engineering Data. (Action: Public Health Engineering Department, Madhya Pradesh)
- Madhya Pradesh Pollution Control Board, Bhopal (MPPCB) is requested to expedite data collection of GW Extraction (for industrial uses), as these data are available exclusively in the CTO letter issued by MPPCB, Bhopal to the industries.
- Surface water supply through pipelines, Paved and unpaved area details, details of Rooftop rain water harvesting and other artificial structures for urban assessment units to be provided by Urban Development and Housing Department.
- Assessment unit wise Amrit Sanovar data and other water conservation data to be provided by MGNREGA.
- Progress of work to be monitored on a regular basis by Central Ground Water Board, North Central Region, Bhopal and Ground Water Survey, Water Resource Department, Bhopal to ensure completion of re-assessment of ground water resources of Madhya Pradesh and approval by State Level Committees timely.

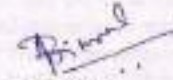
Sh. Chittaranjan Biswal, Scientist-C with permission of chair presented the NAQUIM reports of 13 districts. Chairman of the committee appreciated the work carried out by CGWB, NCR, Bhopal. The chair mentioned that the reports may be shared with district administration and disseminated to general public in simple language. The committee approved the reports prepared by CGWB under National Aquifer Mapping Program.

Further Chittaranjan Biswal, Scientist-C also presented the studies that are going to take up by CGWB, NCR under NAQUIM 2.0 AAP-2023-24 in front of the committee. The NAQUIM 2.0 are as follows:

- Springshed management studies in Amrupur and Dindori district
- Bhopal Urban studies
- Ujjain Industry areas
- Water stressed area- Alot block of Rullam district

Further the prevention of children falling into abandoned/open tube wells /bore wells also discussed in the meeting. The chairman of the committee advised CGWB to prepare a SOP/ guidelines for this.

The meeting ended with thanks to the Chair.



A K Biswal  
Member Secretary of SLC

Put up for approval

## Appendix-D: Minutes of Second SCL meeting and approval of GWRA-2023

### Minutes of Second meeting of 2<sup>nd</sup> Quarterly Dialogue Event for the state of Madhya Pradesh held on 17.08.2023

The Second Quarterly Dialogue Event was held with water sector departments of Madhya Pradesh in the hall no F-326, VB-3, Bhopal on 17<sup>th</sup> August 2023 at 15:30 hrs. The meeting was chaired by Sh. Manish Singh, Principal Secretary, Water Resource Department, Govt. of Madhya Pradesh. The meeting was attended by officers from Central water Commission Urban Development and Housing Department, MGNREGA, RES, Water Resource Department, Public Health Engineering Department, Farmer Welfare and Agriculture Development Department, Directorate Geology and Mining, Madhya Pradesh Industrial Development Corporation, Madhya Pradesh Pollution Control Board, Central Pollution Control Board, National Institute of Hydrology. The list of officers attended the meeting is enclosed in Annexure-I.

The agenda for this meeting includes –

- 1) Approval of "Ground Water Resources Estimation-2023" Madhya Pradesh by State Level Committee (SLC).
- 2) NAQUIM 2.0
- 3) Surface Water Project Works.

Sh. A K Biswal, Regional Director, CGWB, NCR, Bhopal welcomed all the members present in the meeting.

#### 1. Ground Water Resources Estimation-2023 Madhya Pradesh

With the permission of the chair, a presentation on "Ground Water Resources Estimation-2023 of Madhya Pradesh" was made by Sh. Chittaranjan Biswal, Scientist-C, CGWB, NCR, Bhopal. The gist of the Dynamic Groundwater Resource Estimation 2023 is given below:

Total Number of assessment units in the	313 blocks + 4 Urban areas (Bhopal, Indore, Gwalior)
Total Annual Ground Water Recharge	35.47
Annual Extractable Ground Water	32.85
Annual Ground Water Extraction (bcm)	19.30
Stage of Ground Water Extraction (%)	58.75
No of Over-Exploited Assessment units	26
No of Critical assessment units	5
No of Semi-Critical assessment units	60
No of Safe assessment units	226

The Ground Water Resources Estimation-2023 of Madhya Pradesh was discussed thoroughly by the committee members and after discussion the **Ground Water Resources Estimation-2023 of Madhya Pradesh was approved by the committee.**

Important action points emerged from the discussions of GwRA-2023 are listed below:

- The improvement in category of Indore Urban (over-exploited in 2020 to critical in 2023) need to be communicated with the Urban Development and Housing Department of the Indore City.
- A focused and co-ordinated planning is required for identified water stressed blocks so that the water supply schemes under Amrut 2.0 and Jal Jeevan Mission have sustainable water supply.
- The Madhya Pradesh Madhya Kshetra Vidyut Vitaran Co. Ltd may be included in the committee.

## 2. NAQUIM 2.0

The four priority areas that are finalised and consented in the 2<sup>nd</sup> Quarterly Dialogue Event meeting for NAQUIM 2.0 were discussed.

1. Springshed Study: Anuppur and Dindori district
2. Urban area: Bhopal
3. Industrial area: Ujjain
4. Water stressed area: Alot block (Ratlam block)

Important action points emerged from the discussions of NAQUIM 2.0 are listed below:

- The state government requested to include Over-exploited and water stressed **Jaora block** of Ratlam district in NAQUIM 2.0 priority area.
- National Institute of Hydrology (NIH), Bhopal agreed to support CGWB, NCR Bhopal in completing the scientific studies in Jaora block as mentioned above.

Apart from this some other points also raised in the meeting as follows:

- MPIDC (Madhya Pradesh Industrial Development Cooperation) is requested to provide site for construction of piezometer in their industrial areas.
- The SOP for preventing Children from falling in borewell in Madhya Pradesh should be prepared in consultation with the state government.

Further a presentation was made by Sh. Neelam Narolia, Director, Central Water Commission, Madhya Pradesh regarding the progress of various surface water projects being carried out in Madhya Pradesh.

The meeting ended with thanks to the Chair.

*Biswal*  
29/8/23

A K Biswal  
Regional Director, CGWB  
Member Secretary of SLC

Chairman for approval please

*approved*

*29/8*

### Appendix-E: Minutes of CLEG meeting and approval of GWRA-2023

#### Minutes of Meeting of Central Level Expert Group for Re-assessment of Ground Water Resources of India for 2023 (held through Hybrid Mode)

Date: 27.09.2023

The meeting of the Central Level Expert Group (CLEG) for re-assessment of the Ground Water Resources of India for 2023 was held under the Chairmanship of Shri Satish Kumar, Chairman, Central Ground Water Board (CGWB) through Video Conferencing on 27.09.2023 at 04.00p.m. The list of participants is attached (Annexure).

Shri. Satish Kumar, Chairman, CGWB & Chairman, CLEG, welcomed all the Members of Central Level Expert Group and participants. He briefed the participants about the Ground Water Resource Assessment 2023 and congratulated all Officers of State GW/Nodal Departments, Regional offices of CGWB and IIT Hyderabad for their sincere efforts for completion of GW Resource Assessment for 2023 through web based application "INDIA-GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES)".

A brief presentation on findings of 'National Compilation on Ground Water Resources of India, 2023' was made by Dr. Ratikanta Nayak, Regional Director, CGWB, HQ, Faridabad. It was informed that all the States/UTs have successfully assessed their ground water resources jointly with CGWB. State Level Committees (SLCs) of 30 States/UTs have approved the GW Resource Assessment for their respective States/UTs. The GWRA-2023 for Chhattisgarh, Punjab, Telangana, Chandigarh, Dadra & Nagar Haveli, Daman & Diu, Jammu & Kashmir are yet to be approved by their respective States/UTs. However, the results of joint assessment of State Government and CGWB have been considered for National Compilation of Dynamic Ground Water Resources of India, 2023.

Salient features of the national scenario of dynamic ground water resources of India, based on the outputs of assessment as in 2023 in respect of 36 States and outputs of assessment as in 2023 in respect of India were presented and discussed. The members appreciated the work done by CGWB, State Departments and IIT Hyderabad and expressed their agreement with the whole process of assessment and outcome of 'National Compilation on Ground Water Resources of India, 2023'.

The presentation was followed by discussions and few points are listed below.

	Actionable point:	Action taken/ to be taken by
1	Quality Tagging of Assessment Units	In the National Report of Dynamic Ground Water Resources of India-2023, an annexure of Quality Tagging of Assessment Units is already included.

2	Analysis of Recharge from Other Sources	A detailed analysis to be carried out by the Resource cell, CGWB, CHQ Faridabad for various components of Recharge from Other Sources.
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The Members of CLEG approved the Ground Water Resource Assessment -2023 of India.

Smt. T.S. Anitha Shyam, Member (South) and Member Secretary of the committee appreciated the efforts of Officers at CHQ, Faridabad for timely compilation of National Report. She appreciated the CLEG members for their valuable inputs which have helped in the realistic assessment of ground water resources in the country.

The meeting ended with thanks to the Chair.

## **INSPIRATION**

**Sh. Manish Singh**

Principal Secretary, Water Resource Department, Govt. of Madhya Pradesh

**Dr. Sunil Kumar Ambast**

Chairman, Central Ground Water Board

## **GUIDANCE**

**Sh A K Biswal**

Regional Director, CGWB, NCR, Bhopal

**Sh. Shishir Kushwaha**

Engineer in Chief, Water Resource Department

**Sh. G P Soni**

Chief Engineer (BODHI), Water Resource Department

## **PRINCIPAL CONTRIBUTOR**

**Sh. Chittaranjan Biswal**

Scientist-C, CGWB, NCR, Bhopal

## **OTHER CONTRIBUTORS**

### **Central Ground Water Board, North Central Region**

**Sh. Pradip Roy**, Scientist-B

**Ms. Saumya Choudhary**, Scientist-B

**Sh. Kodali Laxman Pradip**, Asistant Hydrogeologist

**Ms. Saumya Siddharth**, Asistant Geophysicist

### **Ground Water Survey, Water Resource Department**

**Dr Jitendra Jain**, Superitending Geohydrologist

#### **GWALIOR DIVISION**

**Sh. Alok Kulshresth**, Senior Geohydrologist

**Mrs Sonali Singh**, Asistant Engineer

**Sh. D P Bamoriya**, Sub Engineer

**Sh. H S Shakya**, Sub Engineer

**Sh. R K Gupta**, Sub Engineer

**Sh. S S Mishra**, Sub Engineer

#### **JABALPUR, BALAGHAT AND REWA DIVISION**

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#### **KHANDWA DIVISION**

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**Sh. Sanjay Mahajan**, Assistant Geohydrologist

**Sh. Pankaj Chouhan**, Assistant Geohydrologist

**Sh. Sudesh Deokata**, Assistant Geohydrologist

**Sh. Prakash Vyas**, Assistant Geohydrologist

**Sh. Shanka Lal Ladhe**, Sub Engineer

### **SAGAR DIVISION**

**Sh. R K Sahu**, Senior Geohydrologist

**Sh. S. S. Ahirwar**, Assistant Geophysicist

**Sh. Vikas Pimpalkar**, Assistant Geohydrologist

**Sh. Satish Namdev**, Assistant Geohydrologist

**Sh. Kulwant Singh**, Sub Engineer

**Sh. A K Khare**, Sub Engineer

**Sh. Sanjay Jodhpurkar**, Assistant Geohydrologist

**Sh. Neeraj Sharma**, Sub Engineer

### **UJJAIN DIVISION**

**Sh. Sudhir Kumar Sharma**, Senior Geohydrologist

**Sh Prakash Choudhary**, Assistant Geohydrologist

**Sh. S S Waskel**, Assistant Geohydrologist

**Sh. K S Sisodiya**, Assistant Geohydrologist

**Sh. Hemant Kumar Devara**, Assistant Geohydrologist

**Sh. Ajaya Jain**, Assistant Geohydrologist

## **REFERENCES**

- 1 Dynamic Ground Water Resources of Madhya Pradesh (2009), CGWB ,NCR, Govt Of India and GWS, WRD, Govt. of MP
- 2 Dynamic Ground Water Resources of Madhya Pradesh (2011), CGWB ,NCR, Govt Of India and GWS, WRD, Govt. of MP
- 3 Dynamic Ground Water Resources of Madhya Pradesh (2013), CGWB ,NCR, Govt Of India and GWS, WRD, Govt. of MP
- 4 Dynamic Ground Water Resources of Madhya Pradesh (2017), CGWB ,NCR, Govt Of India and GWS, WRD, Govt. of MP
- 5 Dynamic Ground Water Resources of Madhya Pradesh (2020), CGWB ,NCR, Govt Of India and GWS, WRD, Govt. of MP
- 6 Dynamic Ground Water Resources of Madhya Pradesh (2022), CGWB ,NCR, Govt Of India and GWS, WRD, Govt. of MP
- 7 Ground Water Year Book (2022), Madhya Pradesh, CGWB, NCR, Govt. of India
- 8 Rainfall Statistics of India (2021), India Meteorological Department, Govt. of India

## **ABBREVIATIONS**

bcm	Billion Cubic Meter
C	Command
CGWB	Central Ground Water Board
CLEG	Central Level Expert Group for overall reassessment of ground water resource of the country
cm	Centimeter
DOWR, RD & GR	Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India
GEC-1984	Ground Water Estimation Committee, 1984
GEC-1997	Ground Water Resources Estimation Committee, 1997
GWRA- 2015	Ground Water Resources Estimation Committee, 2015
GWS	Ground Water Survey
ham	Hectare meter
IMD	India Meteorological Department
LPA	Long Period Average
lps	Litres per second
m	Meter
m bgl	Meter below ground level
mcm	Million cubic Meter
m ham	Million hectare meter
mm	Millimeter
NABARD	National Bank for Agricultural and Rural Development
NC	Non Command
Sq. m	Square Meter
WRD	Water Resource Department



**CENTRAL GROUND WATER BOARD**  
**North Central Region, Bhopal**  
**Department of Water Resources, GR & RD**  
**Ministry of Jal Shakti**  
**Government of India**  
[rdncr-cgwb@nic.in](mailto:rdncr-cgwb@nic.in)

&

**GROUND WATER SURVEY**  
**Water Resources Department**  
**Government of Madhya Pradesh**  
[segwsbpl@ymail.com](mailto:segwsbpl@ymail.com)