CENTRAL GROUND WATER BOARD

DEPARTMENT OF WATER RESOURCES,

RIVER DEVELOPMENT AND GANGA REJUVENATION,

MINISTRY OF JAL SHAKTI

GOVERNMENT OF INDIA

INCEPTION REPORT ON NAQUIM-2.0 OF RAIPUR URBAN, DHARSIWA BLOCK, RAIPUR DISTRICT, CHHATTISGARH STATE

AAP: 2023-24

Team Lead – Priyanka B. Sonbarse

Scientist-C (Hydrogeologist)

NORTH CENTRAL CHHATTISGARH REGION, RAIPUR

APRIL - 2023

CONTENTS

INCEPTION REPORT ON NAQUIM-2.0 OF RAIPUR URBAN, DHARSIWA DISTRICT, CHHATTISGARH

1	**STUDY AREA**	**Raipur Urban Agglomerate, Dharsiwa Block, Raipur district**
1.1	**Area**	503 km^2
1.2	**Latitude**	*21.2514 N*
1.3	**Longitude**	81.535833 and 81.829444 E longitude
1.4	**Villages**	83
1.5	**Total population**	211052
1.6	**Male**	106972
1.7	**Female**	104080
1.8	**Rural Population**	211052
1.9	**Urban Population**	1155089
1.10	**Growth Rate (10 Years)**	-18.85
1.11	**Climate**	Sub-Tropical
1.12	**Average Rainfall**	1489 mm
1.13	**Geomorphology**	Chhattisgarh Plain
1.14	**Drainage**	Kharun River Chhokra River
1.15	**Soil type**	Sandy soil, Lateritic and Regolith soil
1.16	**Geology**	Chandi Limestone, Chandi Sandstone Gunderdehi Shale
2	**PRIORITY TYPE**	The proposed urban **Raipur Urban Agglomerate** under naquim 2.0 to be mapped in 1: 10000 considering the constant growth of population, industrallisation and urbanization
3	**PREVIOUS STUDIES**	
		Systematic Survey
3.1	**Reappraisal Survey**	Reappraisal survey carried before 2020.
3.2	**NAQUIM report of Dharsiwa block 2020-21**	NAQUIM studies carried out in Dharsiwa block in 2020-21 by CGWB stressed on reducing the ground water draft in the command area and encourage farmers to take less water consuming crops such as Maize/Finger Millet (Ragi) instead of cultivating summer rice, which requires up to 1500 mm of irrigation water. This will reduce the groundwater development by up to 70%. The reasons behind the high development of groundwater include excessive withdrawal of groundwater, low yield and transmissivity of the aquifer, and localised fractures. Field irrigation should be replaced with channel irrigation in command and non-command areas, and micro irrigation methods should be used in command and non-command areas. Mass awareness, incentives, assured prices, better marketing, technology development, model crop specific to the area,

		animal grazing, group or community fencing, training programmes, and other media should be used to discourage farmers from taking summer rice.
3.3	**Resource Assessment**	As per GEC-2022 the stage of groundwater development is 96.21% and is categorized as Critical. The annual extractable groundwater resource is 84.50 MCM, whereas the total draft is 81.30 MCM. The irrigation water draft accounts for 38.96% of the total water used.
3.4	**Published Paper**	• Sridhar (1995). Chemical Characteristics of the Groundwater in parts of Dharsiwa Block, Raipur District, Madhya Pradesh. Journal of Ravishankar University (Part-B: Science), 8(1), pp. 51-60. • Aman Kumar Bohidar & Ishtiyaq Ahmad (2021). Development of Conceptual Model and Groundwater Flow Modeling Using GMS Software: A Case Study for Dharsiwa Block, Chhattisgarh, India • Pritee Pandey et.al.(2022) Valuation of uranium contamination of Raipur district of Chhattisgarh: GIS assisted hydrogeochemical study of underground water. • Singh and Diwan (1988). Quantitative analysis of watershed geomorphology in Chokra Nala basin, district Raipur, M.P. Journal of Ravishankar University (Part-B: Science), 1(1), pp. 63-70.

4	**OBJECTIVES OF THE PRESENT STUDY**	Groundwater has been used everywhere for a long time because of its easy accessibility and good quality. In urban areas, groundwater as a source of domestic, commercial and industrial water has greatly contributed to the development of cities. The ground water is vulnerable to contaminate both natural and anthropogenic. Hence, the objectives of the present study is to delineate: 1. Aquifer mapping watershed wise (as AMU) 2. Demand and supply. 3. Detailed Aquifer Dispositions. 4. Aquifer-wise ground water Water Levels. 5. Delineation of Recharge Areas. 6. Estimation/Refinement of parameters used for resource assessment. 7. Assessment of ground water resources. 8. Ground Water Quality. 9. Areas showing signs of subsidence. 10. Ground Water Quality Management Interventions, including demarcation of safer aquifers. 11. Artificial Recharge Plan. 12. Other measures. 13. Identification of potential aquifers for drinking water supply 14. A plan for drinking water source sustainability. 15. Finally, to evolve a block-level management plan which is implementable.
5	**EXISTING DATA**	
		Number
5.1	**Exploratory Well**	13
5.2	**Observation Well/ Peizometer**	6
5.3	**VES/TEM**	8
5.4	**NHS**	4
5.5	**Water Quality**	9
5.6	**Infiltration Test**	Nil
5.7	**Pumping Tests**	
6	**AQUIFER WISE DATA GAP ANALYSIS**	
		No of Additional Structures Required
6.1	Chandi Limestone	EW/OW/PZ - 5 VES/TEM - 6 upto 200 m Water Level - 40 (Monitoring Wells DW/BW) Water Sample - 60 Infiltration Test - 6 Pumping Tests/Slug Test - 4

6.2	Chandi Sandstone	EW/OW/PZ - 2 VES/TEM - 6 upto 200 m Water Level - 30(Monitoring Wells DW/BW) Water Samples - 40 Infiltration Test - 4 Pumping Tests/Slug Test - 4

7. NEW DATA GENERATION

7.1 Activity wise monthly targets for new data generation

S. No	Deliverables	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan		
1	Establishment of new wells and aquifer property	■	■					■				
2	Sample Collection	■						■				
3	Analysis of the Water Quality Data		■	■	■				■	■		
4	VES/TEM	■	■				■	■	■			
5	Demand Assessment	■	■									
6	Rainfall Infiltration Test	■	■					■	■			
7	Pumping test/Slug test	■	■				■	■				
8	Farmer Feedback	■	■					■	■			

7.2 Plan for integration with other ongoing activities

- Addition of refined parameters in the calculation of GWRA-2023
- Preparation of recharge plan according to abstraction structures proposed in Jal Jeevan Mission and Nal Jal Yajna.

8. MONTH-WISE ACTIVITY PLAN

S. No	Deliverables	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	Aquifer Dispositions				■	■	■					
2	Aquifer-wise ground water Water Levels	■	■		■			■		■		
3	Delineation of Recharge Areas								■	■		
4	Estimation/Refinement of parameters used for resource assessment	■	■					■	■	■		
5	Assessment of ground water resources							■	■	■		
6	Ground Water Quality	■						■				
7	Areas showing signs of subsidence	■						■	■			
8	Ground Water Quality Management Interventions including demarcation of safer aquifers						■	■	■	■		
9	Artificial Recharge Plan							■	■	■		
10	Other measures including meeting with state officials for additional data generation and presentation to the DM/DCs	■	■				■				■	■
11	Identification of potential aquifers for drinking water supply				■	■	■	■	■			
12	A plan for drinking water source sustainability				■	■	■	■	■	■		

9. COMPOSITION OF TEAM

Team Lead	- Priyanka B. Sonbarse	Hydrogeologist (Sc-C)
Expert (Hydrogeology)-1	- Sarboday Barik	Hydrogeologist (AHg)
Expert (Geophysics)	- Dr. Ajaya Ku. Sinha	Geophysicist (Sc-D)
Expert (Hydro chemistry)	- Dr. Rajnikant Sharma	Chemist (Sc-C)

10. TEAM-MEMBER-WISE RESPONSIBILITIES AND MONTHLY TARGETS FOR ENTERING IN THE MIS

10.1 Role and Responsibility

Role	Responsibilities	Indicative Designation
Team Lead -Priyanka B. Sonbarse (Sc-C)	- Planning, Supervision and Execution of the Project - Work distribution and monitoring of activities of other team members - Preparation of the inception report. - Timely Delivery of the envisaged Outputs - Finalisation of the management plan - Presentations at different forums, sharing of the outputs. - Preparation of the draft report as per the approved Quality Standards and its Final Submission. - Other members of the team will assist the team lead. -	Hydrogeologist

Expert (Hydrogeology)-1 Sarboday Barik (A.Hg)	- Field Data Collection (Exploration, Pz construction, Water Level, Water Quality, Pumping Tests, Infiltration tests, demand/supply data, sample surveys and others) - Sample collection for quality studies - Secondary Data collection - Entering data in database (WIMS) - Integration of data, preparation of thematic maps, preparation cross sections etc. - Consultation with allied experts like agriculture, irrigation, agro-economics etc. - Preparation of Management Plan - Assisting the Team Lead in preparing maps and reports	Hydrogeologist
Expert (Geophysics) -Dr. Ajaya Ku. Sinha (Sc-D)	- Field Geophysical Surveys - Interpretation of field data - Entering data in database (WIMS) - Integration with existing geophysical and lithology data - Preparation of inferred lithologs - Suggesting potential sites for construction of water wells/artificial recharge - Preparation of Tables, graphs and maps for reports - Assisting the Team Lead in preparing the Report	Geophysicist
Expert (Hydro chemistry) Dr. Rajnikant Sharma (Sc-C)	- Sample collection for quality studies - Analysis of samples. - Integration with existing data - Validation and interpretation of data - Entering data in database (WIMS) - Preparation of Tables, graphs and maps for reports - Assisting the Team Lead in preparing the reports	Chemist

10.2 Monthly Target for entering in the MIS

Team Lead Priyanka B. Sonbarse (Sc-C)	**Apri**l – Data Gap Analysis and Preparation of Inception Report
	May - Field Data Collection
	June - Field Data Collection
	July- Data Analysis and Interpretation
	August- Data Analysis and Interpretation
	September -Data Analysis and Interpretation
	Octuber – Preparation for Midterm Work-Shop for NLEC
	November - Field Data Collection and preparation of Management Plan
	December -Sample Surveys and User Feedback
	January – Preparation of Draft Report
	February–Field Truthning of Management Plan
	March - Sharing of the reports with CHQ, SGWCC and DM/DC

Expert (Hydrogeology)-1 Sarboday Barik (A.Hg)	- **May** - Field Data Collection and other ongoing field activities.
	- **June** - Field Data Collection
	- **July**–Data entery in WIMS
	- **August**- Dataentery in WIMS and other ongoing field activities.
	- **September** -Data Analysis and Interpretation
	- **Octuber** – Preparation for Midterm Work-Shop for NLEC
	- **November** - Field Data Collection and preparation of Management Plan and other ongoing field activities.
	- **December** -Sample Surveys and User Feedback and Data entry in WIMS
	- **January** – Preparation of Draft Report and other ongoing field activities.
	- **February** – Field Truthning of Management Plan and other ongoing field activities.
	- **March -** Sharing of the reports with CHQ, SGWCC and DM/DC and other ongoing field activities.
Expert (Geophysics) Dr. Ajaya Ku. Sinha (Sc-D)	- **May** - Field Geophysical Data Collection and other ongoing field activities.
	- **June** - Field Data Collection
	- **July**–Data Interpretaion and selection of sites suitable for drilling and Data entery in WIMS.
	- **August**- Dataentery in WIMS and other ongoing field activities.
	- **September** -Data Analysis and Interpretation
	- **Octuber** – Preparation for Midterm Work-Shop for NLEC
	- **November** - Field Data Collection and preparation of Management Plan and other ongoing field activities.
	- **December** -Data entry in WIMS
	- **January** – Preparation of Draft Report and other ongoing field activities.
	- **February** – Field Truthning of Management Plan and other ongoing field activities.
	- **March -** Sharing of the reports with CHQ, SGWCC and DM/DC and other ongoing field activities.

Expert (Hydro chemistry) Dr. Rajnikant Sharma (Sc-C)	- **May** - Field Sample Data Collection and other ongoing field activities.
	- **June** - Field sample Collection and analysis.
	- **July**–Field sample Collection and analysis. and Data entery in WIMS.
	- **August**- Dataentery in WIMS and other ongoing field activities.
	- **September** -Data Analysis and Interpretation
	- **Octuber** – Preparation for Midterm Work-Shop for NLEC
	- **November** - Field Data Collection and preparation of Management Plan and other ongoing field activities.
	- **December** -Data entry in WIMS
	- **January** – Preparation of Draft Report and other ongoing field activities.
	- **February** – Preparation of Draft Report and other ongoing field activities.
	- **March -** Sharing of the reports with CHQ, SGWCC and DM/DC and other ongoing field activities.

NAQUIM 2.0 Work Distribution Table (Month-Wise) for Raipur Urban Agglomerate														
Team members:		***Ms. Priyanka B. Sonbarse (Scientist C & Team Leader), Sh. SarbodayBarik (AHG) hydrogeologist-1, ,Sh A K Sinha (Scientist-D, Geophysist), Sh. Rajnikant Sharma Scientist C (Chemist))***												
Sl.	**WORK ITEMS**	**Assignments to be carried out by officers**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**
1	Base map Preparation	Priyanka Sonbarse& Sarboday Barik												
2	Preparation of the Inception Report:	Priyanka Sonbarse& Sarboday Barik												
3	Pre-Monsoon Field Data Collection	Priyanka Sonbarse& Sarboday Barik												

NAQUIM 2.0 Work Distribution Table (Month-Wise) for Raipur Urban Agglomerate															
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4	Pre-Monsoon Sample Surveys and User Feedback	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari , Sh A K Sinha, Sh. Rajnikant Sharma												
5	Pre-Monsoon Other on-going field activities Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha												
6	Data Analysis and Interpretation	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
7	Workshops and mid-term review by NLEC	Ms. Priyanka B. Sonbarse												
8	Post-monsoon Field Data Collection	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
9	Post-monsoon Sample Surveys and User Feedback	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
10	Post-Monsoon Other on-going field activities Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												

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Team members:		***Ms. Priyanka B. Sonbarse (Scientist C & Team Leader), Sh. SarbodayBarik (AHG) hydrogeologist-1, ,Sh A K Sinha (Scientist-D, Geophysist), Sh. Rajnikant Sharma Scientist C (Chemist))***												
Sl.	**WORK ITEMS**	**Assignments to be carried out by officers**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**
11	Data Analysis and Draft Report Preparation	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
12	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
13	Ground Water Management Plan;Fieldtruthing of Management plan & RWH & AR Plan	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
14	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
15	Modification of draft report with additional information collected by the above mentioned field checks - Scrutiny and	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												

NAQUIM 2.0 Work Distribution Table (Month-Wise) for Raipur Urban Agglomerate														
Team members:		***Ms. Priyanka B. Sonbarse (Scientist C & Team Leader), Sh. SarbodayBarik (AHG) hydrogeologist-1, ,Sh A K Sinha (Scientist-D, Geophysist), Sh. Rajnikant Sharma Scientist C (Chemist))***												
Sl.	**WORK ITEMS**	**Assignments to be carried out by officers**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**
	Finalisation of the Report													
16	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Priyanka B. Sonbarse, Sh. Sarboday Bari ,Sh A K Sinha, Sh. Rajnikant Sharma												
17	Sharing of the reports with CHQ, SGWCC and DM/DC - Brochure to be prepared by 31st March.	Ms. Priyanka B. Sonbarse,												