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 DURG BLOCK, DURG DISTRICT, CHHATTISGARH,

CHHATTISGARH

AAP: 2023-24

Team Lead – Prachi Gupta

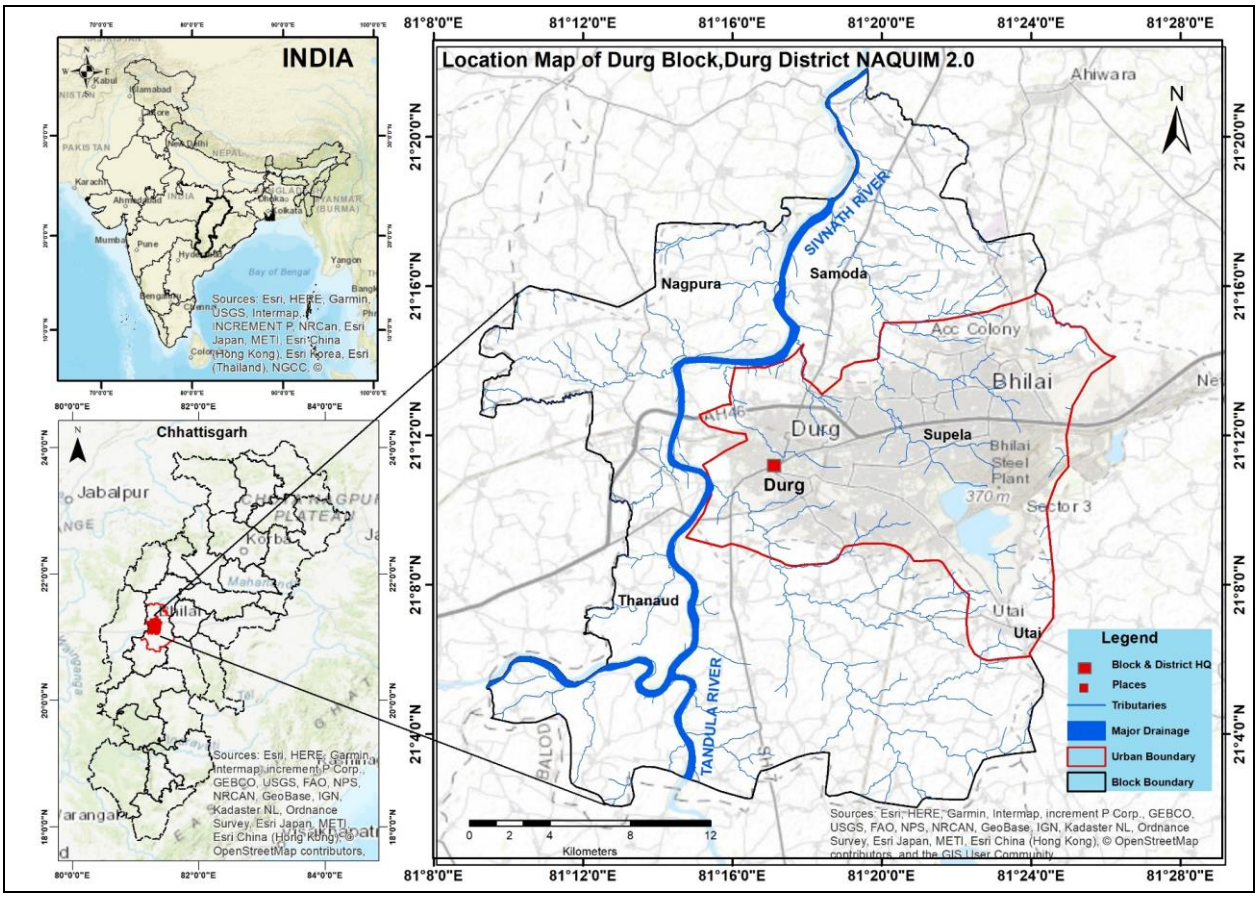
Scientist-C (Hydrogeologist)

NORTH CENTRAL CHHATTISGARH REGION, RAIPUR

APRIL - 2023

CONTENTS

INCEPTION REPORT ON NAQUIM-2.0 OF DURG BLOCK, DURG DISTRICT, CHHATTISGARH



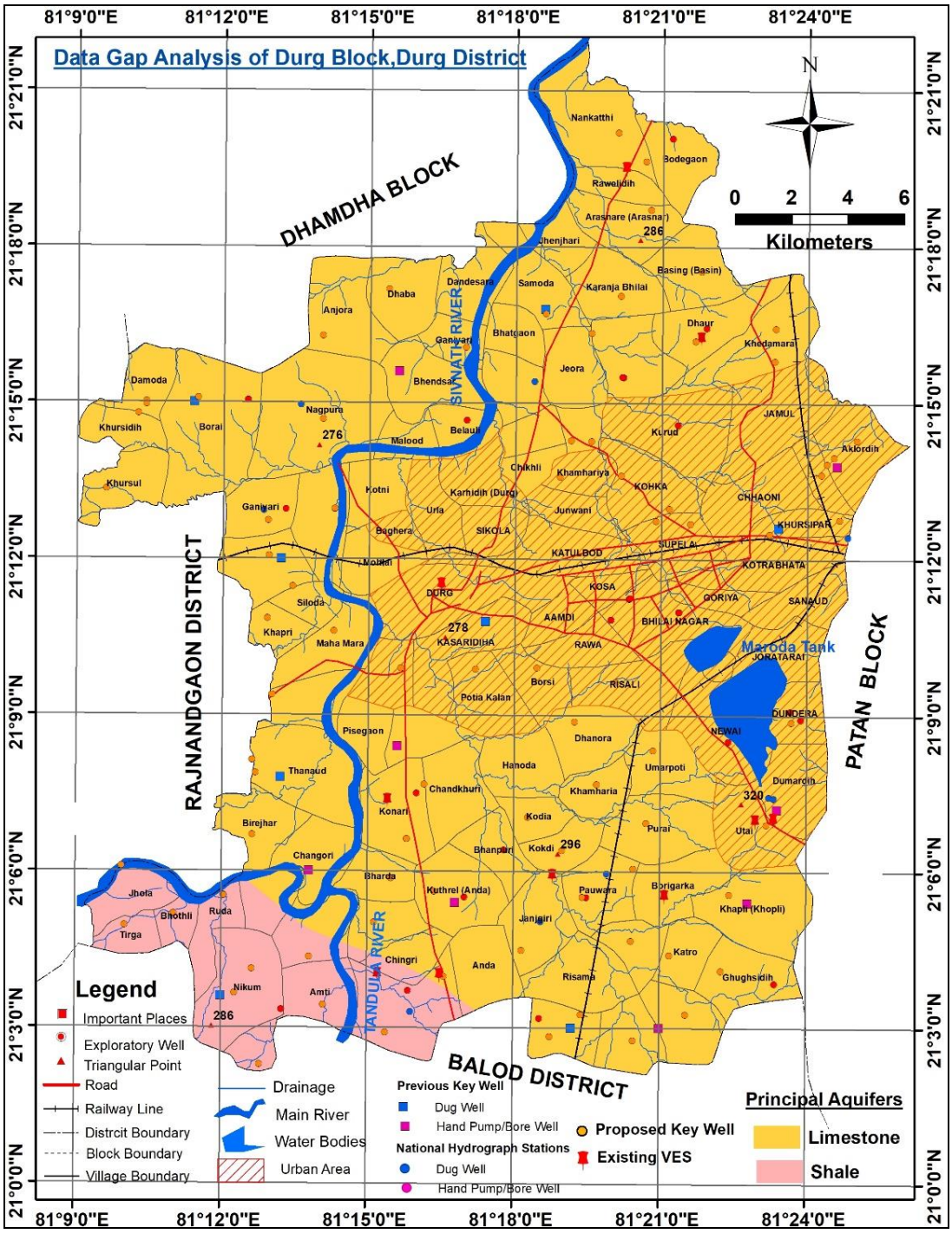
1	STUDY AREA	Durg Block, Durg district
1.1	**Area**	675 km^2
1.2	**Latitude**	21.04 and 21.37 N
1.3	**Longitude**	81.16 and 81.40 E
1.4	**Villages**	117
1.5	**Total population**	1126731
1.6	**Male**	576597
1.7	**Female**	550134
1.8	**Rural Population**	200696
1.9	**Urban Population**	926035
1.10	**Growth Rate**	12.01
1.11	**Climate**	Tropical
1.12	**Average Rainfall**	1213 mm
1.13	**Geomorphology**	Structural plains, Flood plain and Pediment/Pediplain
1.14	**Basin**	Sheonath and Tandula rivers
1.15	**Soil type**	Vertisols, Alfisols
1.16	**Geology**	Alluvium

		Laterite Chandi Formation Gunderdihi Formation
2	**PRIORITY TYPE**	Semi-Critical (Stage of Ground Water Development - 88.15%)
3	**PREVIOUS STUDIES**	
3.1	**Reappraisal Survey**	Reappraisal survey carried before 1995.
3.2	**Central Ground Water Board, NCCR Reports in context to Durg**	• **AQUIFER MAPPING AND MANAGEMENT PLAN Durg Block, Durg District, Chhattisgarh(2016-2017) -** Field to field irrigation (flooding method) should be replaced with channel irrigation in command area as there is about 30-40% conveyance loss in field irrigation. Same amount of water can be saved through channel irrigation. Double cropping of paddy using groundwater is to be discouraged. More water efficient crops like, Maize and Millet to be substituted for paddy during second cropping. Alternative crops to paddy, which are equally profitable and adopt micro-irrigation practices such as drip and sprinkler irrigation should be taken up. IEC activities to be organized to sensitize people on the issues of depleting groundwater resource. Need for massive mass awareness among the farmers to shift from summer rice to Maize/Ragi, advantages of taking such crops, crop methodology and its related aspects. • **GROUND WATER BROCHURE OF DURG DISTRICT CHHATTISGARH 2022-23-** The findings of the study proposes monitoring of deeper zones through construction of purpose built piezometers of desirable depths for having the correct picture of water levels of deeper aquifers. The areas of Durg, Dhamdha and Patan blocks are suitable for artificial recharge requires immediate attention especially in Durg and Dhamda block. To arrest or reduce the velocity of the base flow by constructing suitable sub-surface artificial recharge structures on the upstream side of the drainage in the area can improve the ground water scenario during lean period on the downstream side. Post-monsoon period, surface water bodies like local ponds, farm ponds and small earthen dam along small streams may be constructed to hold water for long duration and for replenishment of soil moisture. Urban hydrogeological study can be taken in Durg town to avoid future problems regarding ground water development and management. • **HYDROGEOLOGICAL SCENARIO AND GROUND WATER QUALITY ASSESSMENT OF DURG-BHILAI URBAN AGGLOMERATE, CHHATTISGARH (2020-21):** the study recommends promotion of adoption of rainwater harvesting and artificial recharge in a big way and participation of the community for making it a success. Incorporation of the compulsory Rainwater Harvesting in the

		by –laws of Nagar Nigam/ Nagar Palikas of the state. Sewage Water Treatment Plant (STP) should be installed by Municipal Corporation for urban sewage water to arrest Nitrate contamination in ground water. Efforts must be made to restore these structures (village ponds, tanks) to their full potential as they act efficient rainwater harvesting structures. With the slight modification abandoned dug wells can be used for artificial recharge, which will help in arresting the declining ground water level. Promoting the farmers to go for crop rotation and to avoid water intensive crops in the rabi period and to implement modern water efficient irrigation techniques etc. In this line, the first attempt may be the formulation of ground water legislaton. To ensure proper implementation of the legislation, a state ground water authority should be formed.
3.3	**Resource Assessment**	As per GEC-2022 the stage of groundwater development is 88.15% and is categorized as Semi Critical. The annual extractable groundwater resource is 94.081 MCM, whereas the total draft is 82.933 MCM. The irrigation water draft accounts for 60.72% of the total water used.
3.4	**Published Paper**	• Singh, C & Shrivastava, P (2017): Study of Hydrogeological Properties of Durg Block, Durg District, Chhattisgarh, India • Chakraborty, Partha Pratim et al. (2015): Geology of Mesoproterozoic Chhattisgarh Basin, central India: current status and future goals. Geological Society, London, Memoirs, 43 (1): 185. • Kumar, T; Gautam, A.K.; Kumar, T(2014): Appraising the accuracy of GIS-based Multi-criteria decision making technique for delineation of Groundwater potential zones • Baghmar, N.K. ; Yadav, S.K. ; Ratre, C.R.; (2011) : Climatic Fluctuations in Durg District of Chattisgarh • Deb, S.P & Chauduri, A (2010): Stratigraphic and tectonic evolution of the Mesoproterozoic Chattisgarh basin in central India

4	**OBJECTIVES OF THE PRESENT STUDY**	The objectives of the present study is to delineate: 1. Detailed Aquifer Dispositions. 2. Aquifer-wise ground water levels. 3. Delineation of Recharge Areas. 4. Estimation/Refinement of parameters used for resource assessment. 5. Assessment of ground water resources(Refinement of Parameters). 6. Ground Water Quality(NO3,Iron,Electical conductivity). 7. Ground Water Quality Management Interventions, including demarcation of safer aquifers. 8. Artificial Recharge Plan. 9. Identification of potential aquifers for drinking water supply 10. Impact of Bhilai Steel Plant/Other industries on ground water regime. 11. A plan for drinking water source sustainability. 12. Finally, to evolve a block-level management plan which is implementable. 13. Recommendations for tackling water logging.
5	**EXISTING DATA**	
		Number
5.1	**Exploratory Well**	22
5.2	**Observation Well/ Peizometer**	04
5.3	**VES/TEM**	20
5.4	**NHS**	13
5.5	**Water Quality**	11
5.6	**Infiltration Test**	Nil
5.7	**Pumping Tests**	5
5.8	**Previous NAQUIM Key Wells**	Hand Pump- 8 Dugwell- 11
5.9	**Previous NAQUIM Chemical Data**	25
6	**AQUIFER WISE DATA GAP ANALYSIS**	
		No of Additional Structures Required
6.1	Chandi Formation (Limestone)	EW/OW/PZ - EW 5/2 OW VES/TEM - 32 upto 300m Water Level - 52 (Monitoring Wells DW/BW) Water Sample - 110 Infiltration Test - 6 Pumping Tests/Slug Test - 3
6.2	Gunderdihi Formation	EW/OW/PZ - EW 2/1 OW VES/TEM - 8 upto 300m

		Water Level - 25(Monitoring Wells DW/BW) Water samples - 50 Infiltration Test - 4 Pumping Tests/Slug Test - 2



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 Yojna.

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											
13	Recommendations for tackling water logging											

9. COMPOSITION OF TEAM

Team Lead	**Prachi Gupta**	Hydrogeologist (Scientist C)
Expert (Hydrogeology)-1	**Gurpreet Kour**	Hydrogeologist (Scientist B)
Expert (Geophysics)	**Nageshwar Rao Elisela**	Geophysicist (Assistant Geophysicist)
Expert (Hydrochemistry)	**Rakesh Dewangan**	Chemist (Sccientist C)

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

10.1 Role and Responsibility

Role	Responsibilities	Indicative Designation
Prachi Gupta Sc-C(Hydrogeologist) & Team Lead	• 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
Gurpreet Kour Sc-B(Hydrogeology)	• 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
Nageshwar Rao Elisela A.Gp(Geophysics)	• 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
Rakesh Dewangan Sc-C(Hydro chemistry)	• 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
Mr.K.C.Naik,EE Expert	• Drilling of EW/OW/Pz • Making Arrangement for Pumping test for private wells,	**AEE/AE/DIC**

(Engineer)	• if required • Preparing note on drilling issues in the area • Plnning and Procurement of Outsourcing Servicer,If required • Making arrangemt for monitoring of Tube Well /Bore Well	

10.2 Monthly Target for entering in the MIS

Prachi Gupta Sc-C(Hydrogeologist) & Team Lead	**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
	October – 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 Truthing of Management Plan
	March - Sharing of the reports with CHQ, SGWCC and DM/DC
Gurpreet Kour Sc-B(Hydrogeology)	**May** - Field Data Collection and other ongoing field activities.
	June - Field Data Collection
	July–Data entry in WIMS
	August- Data entry in WIMS and other ongoing field activities.
	September -Data Analysis and Interpretation
	October – 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 entery in WIMS
	January – Preparation of Draft Report and other ongoing field activities.
	February – Field Truthing of Management Plan and other ongoing field activities.
	March - Sharing of the reports with CHQ, SGWCC and DM/DC and other ongoing field activities.
Nageshwar Rao Elisela A.Gp(Geophysics)	**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 entry in WIMS.
	August- Data entry in WIMS and other ongoing field activities.
	September -Data Analysis and Interpretation
	October – 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 Truthing of Management Plan and other ongoing field activities.
	March - Sharing of the reports with CHQ, SGWCC and DM/DC and other ongoing field activities.
Rakesh Dewangan Sc-C(Hydro chemistry)	**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- Data entry in WIMS and other ongoing field activities.
	September -Data Analysis and Interpretation
	October – 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 Durg Block,Durg District														
Team members:		***Ms. Prachi Gupta (Scientist C & Team Leader), Ms. Gurpreet Kour (Sc-B) hydrogeologist-1, Nageshwar Rao Elisela A.Gp(Geophysics), Rakesh Dewangan, Scientist-C(Hydrochemistry)***												
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	Ms. Prachi Gupta & Gurpreet Kour												
2	Preparation of the Inception Report:	Ms. Prachi Gupta & Gurpreet Kour												
3	Pre-Monsoon Field Data Collection	Ms. Prachi Gupta & Gurpreet Kour												
4	Pre-Monsoon Sample Surveys and User Feedback	Ms. Prachi Gupta, Ms. Gurpreet Kour, Rakesh Dewangan												
5	Pre-Monsoon Other on-going field activities Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Prachi Gupta, Ms. Gurpreet Kour, Mr.K.C.Naik, Nageshwar Rao Elisela												
6	Data Analysis and Interpretation	Ms. Prachi Gupta, Ms. Gurpreet Kour, Nageshwar Rao Elisela, Rakesh Dewangan												
7	Workshops and mid-term review by NLEC	Ms. Prachi Gupta & Gurpreet Kour												
8	Post-monsoon Field Data Collection	Ms. Prachi Gupta, Ms. Gurpreet Kour, Nageshwar												

NAQUIM 2.0 Work Distribution Table (Month-Wise) for Durg Block,Durg District															
Team members:		***Ms. Prachi Gupta (Scientist C & Team Leader), Ms. Gurpreet Kour (Sc-B) hydrogeologist-1, Nageshwar Rao Elisela A.Gp(Geophysics), Rakesh Dewangan, Scientist-C(Hydrochemistry)***													
Sl.	**WORK ITEMS**	**Assignments to be carried out by officers**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**
		Rao Elisela, Rakesh Dewangan												
9	Post-monsoon Sample Surveys and User Feedback	Ms. Prachi Gupta, Ms. Gurpreet Kour, Nageshwar Rao Elisela, Rakesh Dewangan												
10	Post-Monsoon Other on-going field activities Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Prachi Gupta, Ms. Gurpreet Kour, Nageshwar Rao Elisela, Mr.K.C.Naik, Rakesh Dewangan												
11	Data Analysis and Draft Report Preparation	Ms. Prachi Gupta, Ms. Gurpreet Kour, Nageshwar Rao Elisela, Rakesh Dewangan												
12	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Gurpreet Kour, Nageshwar Rao Elisela, Mr.K.C.Naik, Rakesh Dewangan												
13	Ground Water Management Plan;Field truthing of Management plan & RWH & AR Plan	Ms. Prachi Gupta, Ms. Gurpreet Kour, Nageshwar Rao Elisela, Rakesh Dewangan												
14	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Gurpreet Kour, Nageshwar Rao Elisela, Mr.K.C.Naik, Rakesh Dewangan												
15	Modification of draft report with additional information collected by the above mentioned field checks - Scrutiny and Finalisation of the Report	Ms. Prachi Gupta, Ms. Gurpreet Kour, Nageshwar Rao Elisela, Rakesh Dewangan												
16	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Ms. Prachi Gupta, Ms. Gurpreet Kour, Mr.K.C.Naik, Nageshwar Rao Elisela, Rakesh Dewangan												
17	Sharing of the reports with CHQ, SGWCC and DM/DC - Brochure to be prepared by 31st March.	Ms. Prachi Gupta												