



CENTRAL GROUND WATER BOARD
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT AND GANGA REJUVENATION,
MINISTRY OF JAL SHAKTI
GOVERNMENT OF INDIA

INCEPTION REPORT ON NAQIM-2.0 OF DHAMTARI BLOCK,
DHAMTARI DISTRICT, CHHATTISGARH
AAP: 2023-24

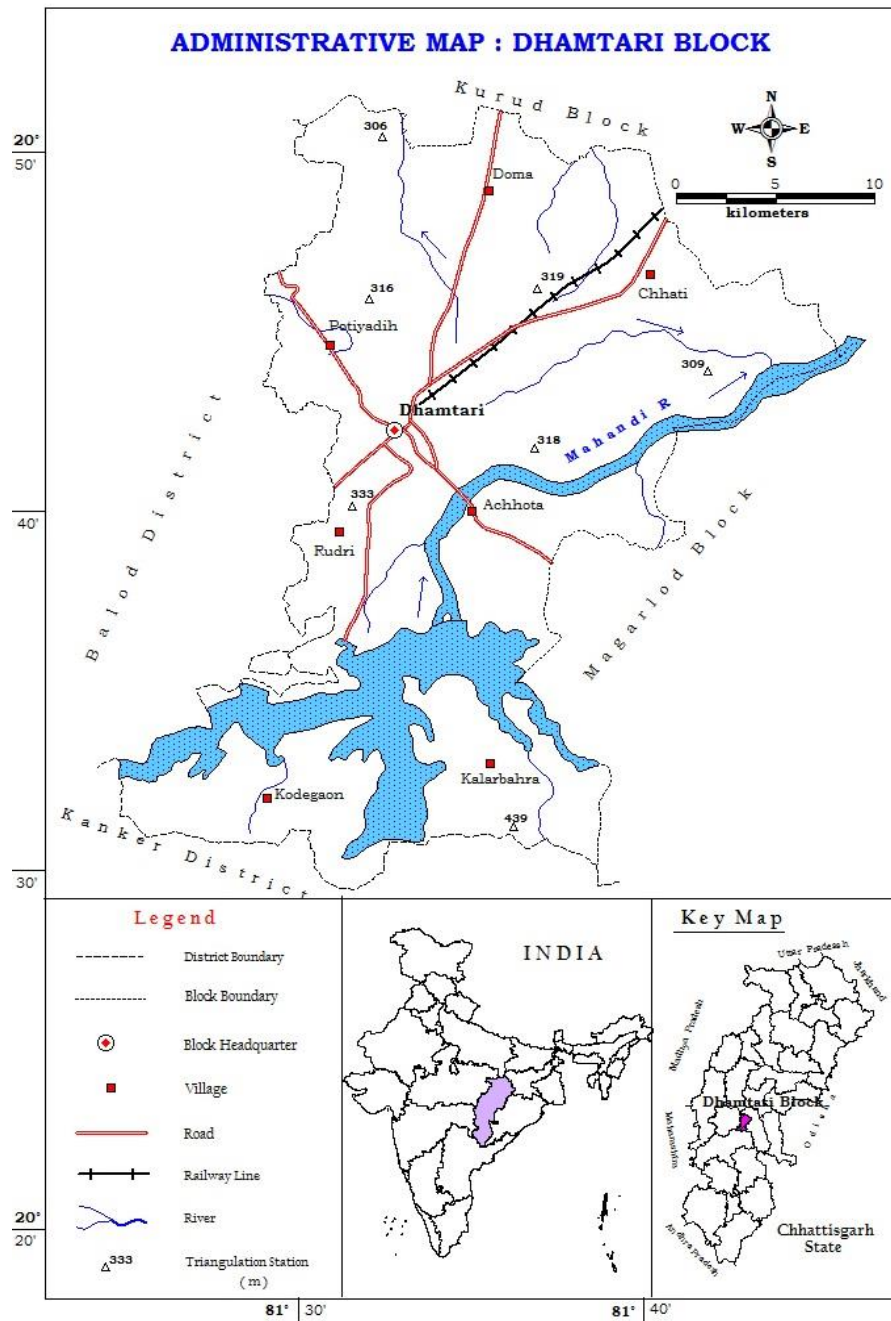
Team Lead – Mukesh Anand
Scientist-B (Junior Hydrogeologist)

NORTH CENTRAL CHHATTISGARH REGION, RAIPUR
APRIL - 2023

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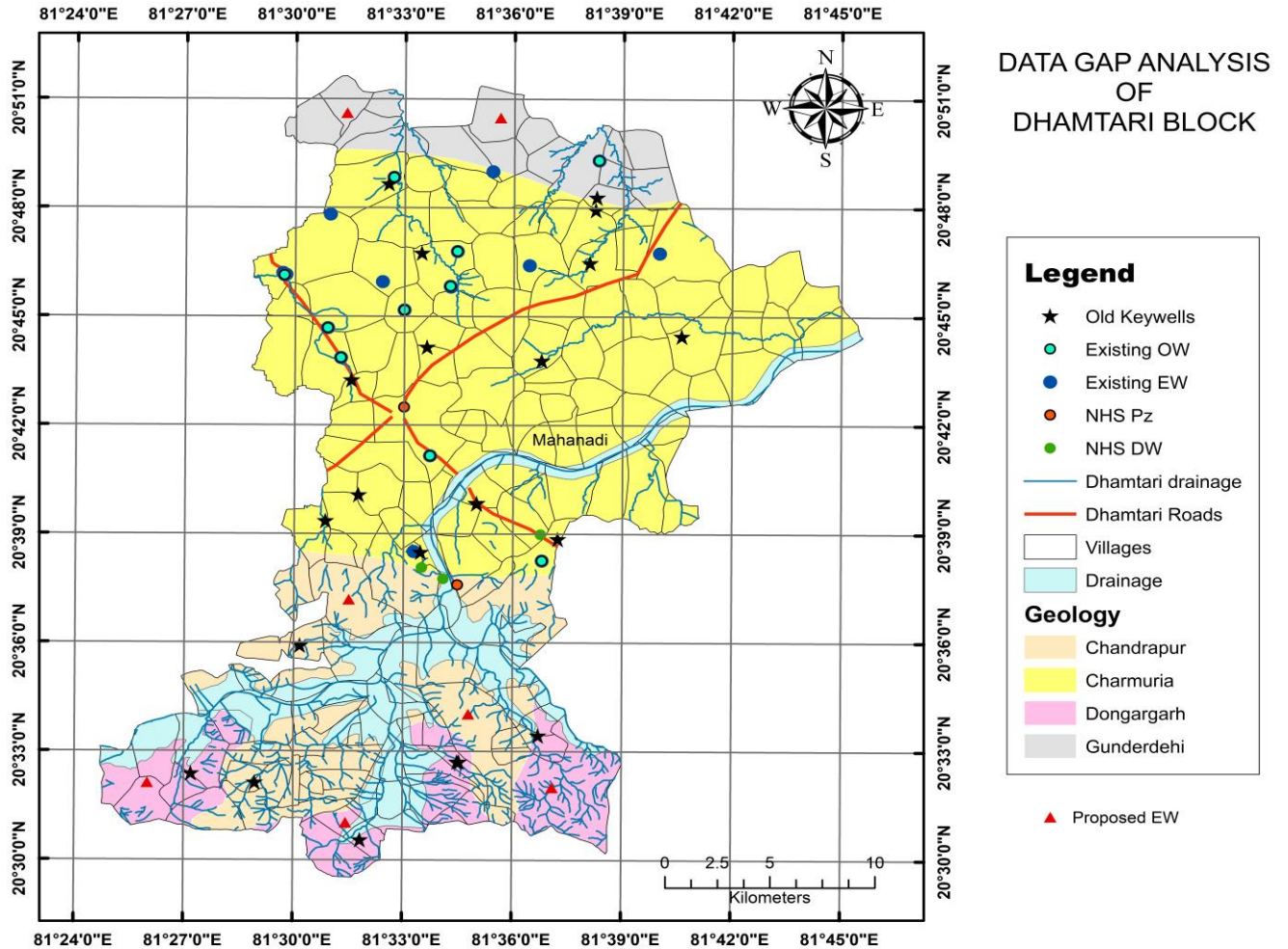


1	STUDY AREA	Dhamtari Block, Dhamtari district
1.1	Area	678 km ²
1.2	Latitude	20.4924 to 20.86 North Latitudes
1.3	Longitude	81.4128 to 81.7597 East Longitudes
1.4	Villages	158
1.5	Total population	2,56,122
1.6	Male	1,27,579
1.7	Female	1,28,543
1.8	Rural Population	1,47,845
1.9	Urban Population	82,111
1.10	Growth Rate	12.03
1.11	Climate	Sub-Tropical
1.12	Average Rainfall	1241.76 mm
1.13	Geomorphology	Structural Plains
1.14	Drainage	Mahanadi River
1.15	Soil type	Medium black Soil, Red and Yellow Soil
1.16	Geology	Charmuria Limestone, Gunderdehi formation, Chandrapur Group, Dongargarh Granite
2	PRIORITY TYPE	Critical
3	PREVIOUS STUDIES	
3.1	Reappraisal Survey	Reappraisal survey carried before 1995.
3.2	Ground water brochure of Dhamtari district (2012-13)	Hydrogeologically Dhamtari district is composed of weathered and fractured granite, fractured shale and cavernous limestone. Yield ranges from 0.1 to 16 lps and transmissivity ranges from 2.51 to 335.96 m ² /day. In terms of quality water is fit for drinking and irrigation. Stage of ground water extraction was 67.39% and for the artificial recharge a total 2049 mcm volume of unsaturated zone was identified for the purpose.
	NAQUIM report of Dhamtari block 2016-17	NAQUIM studies carried out in Dhamtari block in 2016-17 by CGWB-NCCR 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.
	NAQUIM report Dhamtari district 2022-23	The major aquifers present in the study area is Sandstone, Shale, Limestone of the Chhattisgarh Super Group, Sandstone, Shale, Conglomerate of Chandrapur Group and Granite and Gneisses of Dongargarh Super Group. Discharge varies from negligible to 11 lps in fractured aquifer and 10 to 100 m ³ /day in weathered aquifer. High value of TDS, fluoride and nitrate has been reported from several locations. So far as management strategies are concerned for groundwater availability, for effective utilization of groundwater existing draft for irrigation may be coupled with micro- irrigation system and crop rotation system. Farming of high value crops like millets, ragi, maize, plantation crops, fruits, vegetables should be practiced instead of water intensive crops like rice and sugarcane.
3.3	Resource Assessment	As per GEC-2022 the stage of groundwater development is 94.627% and is categorized as Critical. The annual extractable groundwater resource is 125.93 MCM, whereas the total draft is 119.15 MCM. The irrigation water draft accounts for 93.76% of the total water used.
3.4	Published Paper	<ul style="list-style-type: none"> ● Kumar, Aekesh, M. P. Tripathi, Dhiraj Khalkho, and Shreeya Baghel. "Assessment of groundwater quality using GIS in Kurud block of Dhamtari district Chhattisgarh." Journal of Soil and Water Conservation 19, no. 4 (2020): 426-435. ● Mukherjee, Arunangshu, and Dinesh Tewari. "7-Emerging Challenges in Groundwater Resource Management before Newly Created State with Special Reference to Chhattisgarh." (2006). ● Charpe, Prabhakar. "AN ANALYSIS ON THE IMPROVEMENT OF WATER RESOURCE MANAGEMENT SYSTEM IN CHHATTISGARH" An International Journal of Management & IT A Refereed Research Journal Vol 9 / No 2 / Jan-Jun 2018. ● Naik, Prakash Chandra. Seawater Intrusion in the Coastal Alluvial Aquifers of the Mahanadi Delta. Springer International Publishing, 2018. ● Adyalkar, P. G., P. N. Phadtare, and K. Ramanna.

		<p>"Buried sinkhole of Dhamtari in the Charmuria limestone of Raipur district in Madhya Pradesh and its hydrogeological significance." <i>Current Science</i> (1973): 131-133.</p> <ul style="list-style-type: none"> • Kumar, Navneet, Bernhard Tischbein, Jürgen Kusche, Mirza Kaleem Beg, and Janos J. Bogardi. "Impact of land-use change on the water resources of the Upper Kharun Catchment, Chhattisgarh, India." <i>Regional Environmental Change</i> 17 (2017): 2373-2385. • Kumar, Navneet, Bernhard Tischbein, Mirza Kaleem Beg, and Janos J. Bogardi. "Spatio-temporal analysis of irrigation infrastructure development and long-term changes in irrigated areas in Upper Kharun catchment, Chhattisgarh, India." <i>Agricultural Water Management</i> 197 (2018): 158-169.
4	OBJECTIVES OF THE PRESENT STUDY	<p>The objectives of the present study is to delineate:</p> <ol style="list-style-type: none"> 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. 6. Ground Water Quality. 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. A plan for drinking water source sustainability. 11. Finally, to evolve a block-level management plan which is implementable. 12. Plan for conjunctive use of surface and ground water
5	EXISTING DATA	
		Number
5.1	Exploratory Well	22
5.2	Observation Well/ Peizometer	11
5.3	VES/TEM	48
5.4	NHS	09
5.5	Water Quality	47
5.6	Infiltration Test	Nil
5.7	Pumping Tests	Nil

6	AQUIFER WISE DATA GAP ANALYSIS	
		No of Additional Structures Required
6.1	Charmuria Limestone	EW/OW/PZ - 0 VES/TEM - 10 upto 200 m Water Level - 30 (Monitoring Wells DW/BW) Water Sample - 60 Infiltration Test - 2 Pumping Tests/Slug Test - 2
6.2	Chandrapur formation	EW/OW/PZ - 3 VES/TEM - 10 upto 200 m Water Level - 20 (Monitoring Wells DW/BW) Water Samples - 40 Infiltration Test - 2 Pumping Tests/Slug Test - 2
6.3	Dongargarh Granite	EW/OW/PZ - 2 VES/TEM - 5 upto 200 m Water Level - 5 (Monitoring Wells DW/BW) Water Quality - 10 Infiltration Test - 2 Pumping Tests/Slug Test - 2
6.4	Gunderdehi formation	EW/OW/PZ - 3 VES/TEM - 5 upto 200 m Water Level - 10 (Monitoring Wells DW/BW) Water Sample - 20 Infiltration Test - 2 Pumping Tests/Slug Test - 2



7. NEW DATA GENERATION

7.1 Activity wise monthly targets for new data generation

Sl. No	Deliverables	M a y	J u n e	J u l y	A u g	S e p	O c t	N o v	D e c	J a n
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 Yojana and Co-ordination with MGNREGA wing under district administration for implementation of recharge plan.

8. MONTH-WISE ACTIVITY PLAN

S. No	Deliverables	May	Jun	Jul	Aug	Sept	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	Ground Water Quality Management Interventions including demarcation of safer aquifers											
8	Artificial Recharge Plan											
9	Other measures including meeting with state officials for additional data generation and presentation to the DM/DCs											
10	Identification of potential aquifers for drinking water supply											
11	A plan for drinking water source sustainability											
12	A plan for Cojunctive use of surface and ground water											

9. COMPOSITION OF TEAM

Team Lead	Mukesh Anand	Hydrogeologist (Scientist-B)
Expert (Hydrogeology)-1	Sweta Mohanty	Hydrogeologist (AHg)
Expert (Geophysics)	Dr. Ajay Kumar Sinha	Geophysicist (Scientist-D)
Expert (Hydro chemistry)	Dr. Anita Bind	Chemist (STA)
Expert (Engineer)	Sh. K.C. Naik	Excecutive Engineer

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

10.1 Role and Responsibility

Role	Responsibilities	Indicative Designation
Team Lead Mukesh Anand (Sc-B)	<ul style="list-style-type: none"> ▪ Planning, Supervision and Execution of the Project ▪ Work distribution and monitoring of activities of other team members ▪ Preparation of the inception report. ▪ Field Data Collectio (Data Generation by establishing new Key Wells, Soil Infiltration Tests, Demand/Supply Side Survey, Implemenation of Recharge plans) ▪ Consultation with allied experts like agriculture, irrigation, agro-economics etc. ▪ 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 Sweta Mohanty (A.Hg)	<ul style="list-style-type: none"> ▪ 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. Ajay K. Sinha (Sc-D)	<ul style="list-style-type: none"> ▪ 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 ▪ Valauable Suggestions on Special Study if required in area. ▪ Assisting the Team Lead in preparing the Report 	Geophysicist
Expert (Hydro chemistry) Dr. Anita Bind (STA)	<ul style="list-style-type: none"> ▪ Sample collection for quality studies ▪ Analysis of samples. ▪ Integration with existing data ▪ Validation and interpretation of data ▪ Entering data in database (WIMS) 	Chemist

	<ul style="list-style-type: none"> ▪ Preparation of Tables, graphs and maps for reports ▪ Assisting the Team Lead in preparing the reports 	
Expert (Engineer) Sh. K.C. Naik EE	<ul style="list-style-type: none"> ▪ Drilling of EW/OW/Pz ▪ Making Arrangement for Pumping test for private wells, if required ▪ Preparing note on drilling issues in the area ▪ Planning and Procurement of Outsourcing Services, If required ▪ Making arrangement for monitoring of Tube Well /Bore Well 	Engineer

10.2 Monthly Target for entering in the MIS

Team Lead Mukesh Anand (Sc-B)	April – 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	
Expert (Hydrogeology)-1 Sweta Mohanty (A.Hg)	<ul style="list-style-type: none"> ▪ May - Field Data Collection and other ongoing field activities.
	<ul style="list-style-type: none"> ▪ June - Field Data Collection
	<ul style="list-style-type: none"> ▪ July–Data entry in WIMS
	<ul style="list-style-type: none"> ▪ August- Data entry in WIMS and other ongoing field activities.
	<ul style="list-style-type: none"> ▪ September -Data Analysis and Interpretation
	<ul style="list-style-type: none"> ▪ October – Preparation for Midterm Work-Shop for NLEC
	<ul style="list-style-type: none"> ▪ November - Field Data Collection and preparation of Management Plan and other ongoing field activities.
	<ul style="list-style-type: none"> ▪ December -Sample Surveys and User Feedback and Data entry in WIMS
	<ul style="list-style-type: none"> ▪ January – Preparation of Draft Report and other ongoing field activities.
	<ul style="list-style-type: none"> ▪ February – Field Truthing of Management Plan and other ongoing field activities.
<ul style="list-style-type: none"> ▪ March - Sharing of the reports with CHQ, SGWCC and DM/DC and other ongoing field activities. 	
Expert (Geophysics)	<ul style="list-style-type: none"> ▪ May - Field Geophysical Data Collection and other ongoing field activities.

Dr. Ajay K. Sinha (Sc-D)	▪ June - Field Data Collection
	▪ July -Data Interpretation 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.
Expert (Hydro chemistry) Dr. Anita Bind (STA)	▪ May - Field Sample Data Collection and other ongoing field activities.
	▪ June - Field sample Collection and analysis.
	▪ July -Field sample Collection and analysis. 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 – 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:		<i>Sh. Mukesh Anand (Scientist B & Team Leader), Miss Shweta Mohanty (AHG) Hydrogeologist-1, Dr. Ajay Kumar Sinha Sc-D(Geophysics), Dr. Anita Bind, STA(Hydrochemistry), Sh. K.C. Naik (EE)</i>												
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	<i>Sh. Mukesh Anand & Miss Shweta Mohanty</i>												
2	Preparation of the Inception Report:	<i>Sh. Mukesh Anand & Miss Shweta Mohanty</i>												
3	Pre-Monsoon Field Data Collection	<i>Sh. Mukesh Anand & Miss Shweta Mohanty</i>												
4	Pre-Monsoon Sample Surveys and User Feedback	<i>Sh. Mukesh Anand Miss Shweta Mohanty & Dr. Anita Bind</i>												
5	Pre-Monsoon Other on-going field activities Exploratory drilling, geophysical studies, data entry in WIMS	<i>Sh. Mukesh Anand, Miss Shweta Mohanty, Dr. A.K. Sinha & Sh. K.C. Naik</i>												
6	Data Analysis and Interpretation	<i>Sh. Mukesh Anand, Miss Shweta Mohanty, Dr. A.K. Sinha & Dr. Anita Bind</i>												
7	Workshops and mid-term review by NLEC	<i>Sh. Mukesh Anand & Miss Shweta Mohanty</i>												
8	Post-monsoon Field Data Collection	<i>Sh. Mukesh Anand, Miss Shweta Mohanty, Dr. A.K. Sinha & Dr. Anita Bind</i>												
9	Post-monsoon Sample Surveys and User Feedback	<i>Sh. Mukesh Anand, Miss Shweta Mohanty, Dr. A.K. Sinha & Dr. Anita Bind</i>												
10	Post-Monsoon Other on-going field activities Exploratory drilling, geophysical studies, data entry in WIMS	<i>Sh. Mukesh Anand, Miss Shweta Mohanty, Dr. A.K. Sinha, Sh. K.C. Naik & Dr. Anita Bind</i>												
11	Data Analysis and Draft Report Preparation	<i>Sh. Mukesh Anand, Miss Shweta Mohanty,</i>												

NAQUIM 2.0 Work Distribution Table (Month-Wise) for Durg Block,Durg District

Team members:		<i>Sh. Mukesh Anand (Scientist B & Team Leader), Miss Shweta Mohanty (AHG) Hydrogeologist-1, Dr. Ajay Kumar Sinha Sc-D(Geophysics), Dr. Anita Bind, STA(Hydrochemistry), Sh. K.C. Naik (EE)</i>												
Sl.	WORK ITEMS	Assignments to be carried out by officers	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
		Dr. A.K. Sinha & Dr. Anita Bind												
12	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Miss Shweta Mohanty, Dr. A.K. Sinha, Sh. K.C. Naik & Dr. Anita Bind												
13	Ground Water Management Plan;Field truthing of Management plan & RWH & AR Plan	<i>Sh.Mukesh Anand</i> , Miss Shweta Mohanty, Dr. A.K. Sinha & Dr. Anita Bind												
14	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	Miss Shweta Mohanty, Dr. A.K. Sinha, Sh. K.C. Naik & Dr. Anita Bind												
15	Modification of draft report with additional information collected by the above mentioned field checks - Scrutiny and Finalisation of the Report	Miss Shweta Mohanty, Dr. A.K. Sinha, Sh. K.C. Naik & Dr. Anita Bind												
16	Other ongoing field activities - Exploratory drilling, geophysical studies, data entry in WIMS	<i>Sh.Mukesh Anand</i> , Miss Shweta Mohanty, Dr. A.K. Sinha, Sh. K.C. Naik & Dr. Anita Bind												
17	Sharing of the reports with CHQ, SGWCC and DM/DC - Brochure to be prepared by 31st March.	<i>Sh.Mukesh Anand</i>												