Government of India

Ministry of Jal Shakti

## Department of Water Resources, RD & GR

Central Ground Water Board

Inception Report for NAQUIM 2.0

SAMBALPUR URBAN AND PERI URBAN AREA (275 SQ.KM)

South Eastern Region,Bhubaneswar

INTRODUCTION

The study area covering mainly Sambalpur Urban and Peri urban area under NAQUIM 2.0 is located in parts of Sambalpur District (Fig-1). The total area under field investigation is around 275 sq.km. The study area lies between $21^0 24'20.23''$ to $21^0 33'31.97''$ N latitudes and $83^0 51'2.79''$ to $84^0 03'12.72''$ E longitudes. The area falls on the Survey of India Topo-sheets Number 64O/13, 64O/14, 73 C/2 and 73 C/3. The location of the study area is shown in fig below and fig.1

Fig. Location of Study Area in Sambalpur District,Odisha State
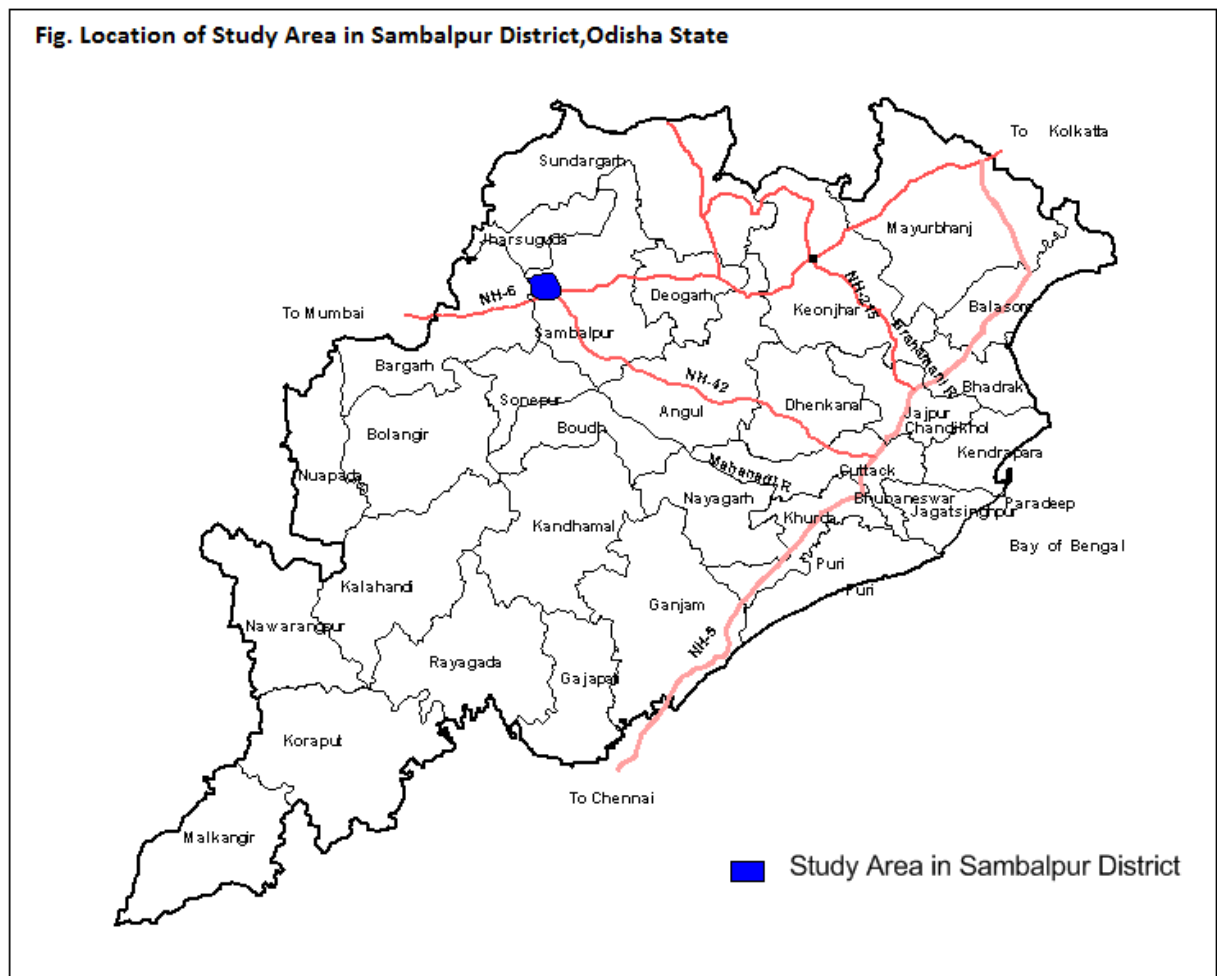
Fig.1.: Base Map of the Study Area (Sambalpur Urban and Peri-Urban Area, Odisha State)
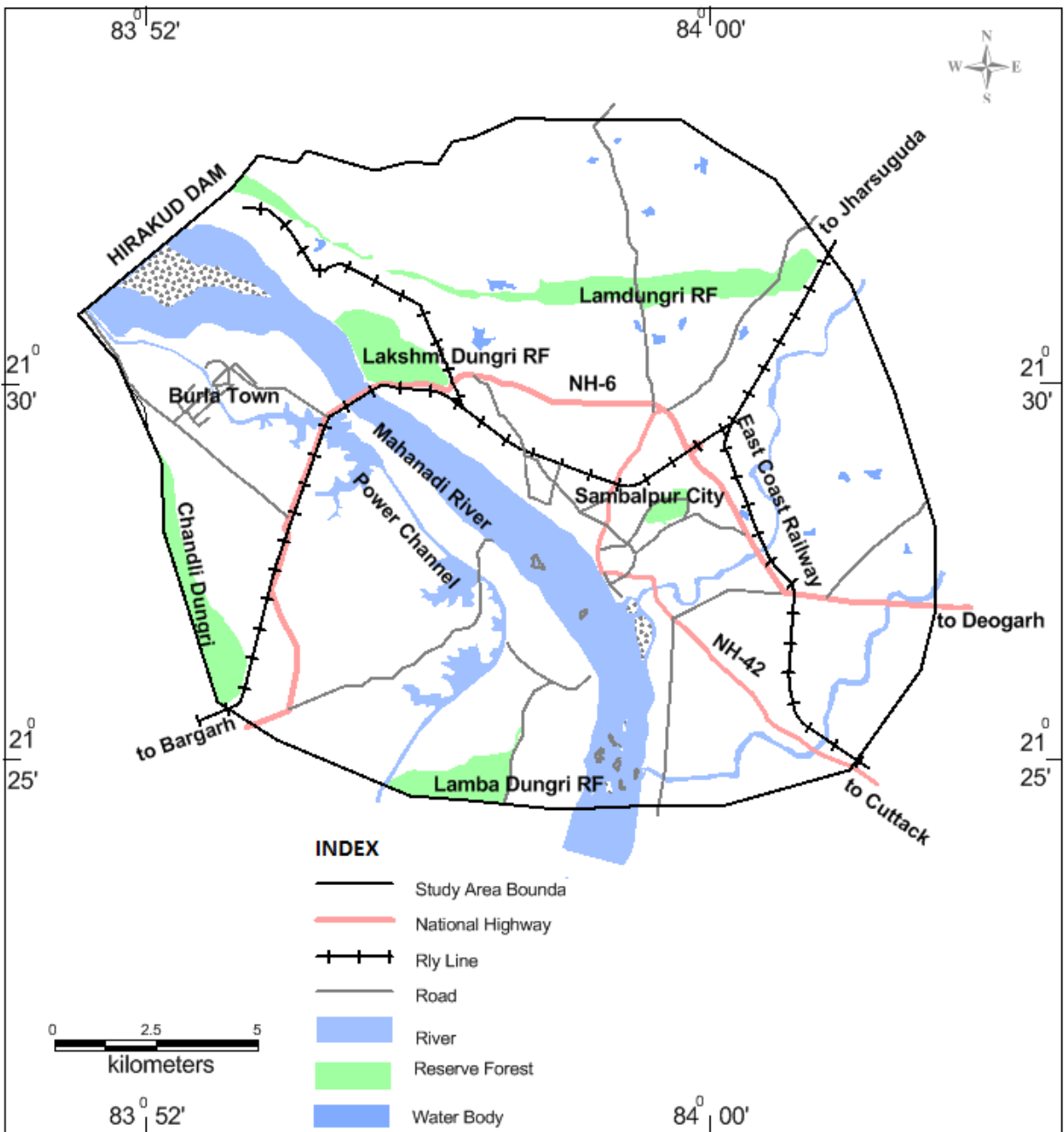
THE PRIORITY TYPES

NAQUIM 2.0 is designed to provide detailed information to support groundwater management decisions at ground level. NAQUIM 2.0 is proposed as issue specific and will be undertaken in prioritized focus areas. .

The area assigned for the present study comes under Urban agglomerate .

PREVIOUS STUDY

Sambalpur District was geologically studied by the Geologically Survey of India and prepared the geological map of the district. The district was covered under Regional Systematic Hydrogeological Survey by the officers of CGWB,SER,Bhubaneswar during the year 1988-89.Ground Water exploration in the district was carried out during 1988-2005 and during 2019-23. NAQUIM study of Sambalpur District was carried out during AAP 2022-23. District brochure has been compiled during 2007. Ground water resources assessment for the district was done for the year 2001,2004,20013,2017,2020 and 2022.

OBJECTIVES OF THE PRESENT STUDY

- ❑ Aquifer-wise ground water Levels

- ❑ Delineation of Recharge Areas

- ❑ Estimation/Refinement of parameters used for resource assessment

- ❑ Assessment of ground water resources

- ❑ Ground Water Quality

- ❑ Ground Water Quality Management Interventions including demarcation of safer aquifers

- ❑ Artificial Recharge Plan

- ❑ Other measures

- ❑ Identification of potential aquifers for drinking water supply

- ❑ A plan for drinking water source sustainability

- ❑ Identify garbage/sewage disposal points in the city and their impact on groundwater

- ❑ Volume percentage of grey water being recycled and reused.

- ❑ Identify water logging prone areas and suitable management plan to mitigate the problem {if any}

- ❑ Demarcate suitable groundwater management unit

- ❑ Develop implementable groundwater management plan

- ❑ Formulate artificial recharge plan and feasible water conservation measures underlining the cost to benefit ratio

- ❑ Study of concretization on ground water recharge.

EXISTING DATA

 The total number of exploratory well, NHS well, Key wells and VES are 03, 4, 2 and 6 numbers respectively.

DATA GAP ANALYSIS

Depending upon the availability of exploratory well, NHS well, Key wells and VES, the proposed Key wells , exploratory well, and VES in the study area are as follows.

1.EW/OW:-Depending upon the existing exploration data a data gap map is generated. Total 11 Exploratory wells are proposed in the study area. (Fig.2)

2.Key wells: Total 04 National Hydrograph Network Stations (NHNS) are present in the study area. Depending upon the existing NHNS a data gap map is prepared. Total 20 key wells(20 Dug wells and 10 borewells/hand pump) are proposed in the study area. (Fig.3)

3.VES: 06 existing VES data is present So another 17 VES is proposed in the NAQUIM study area. A data gap map is prepared based on existing data.(Fig.4)

Fig.2: Proposed Data Generation for the Study Area (Sambalpur Urban and Peri-urban Area)
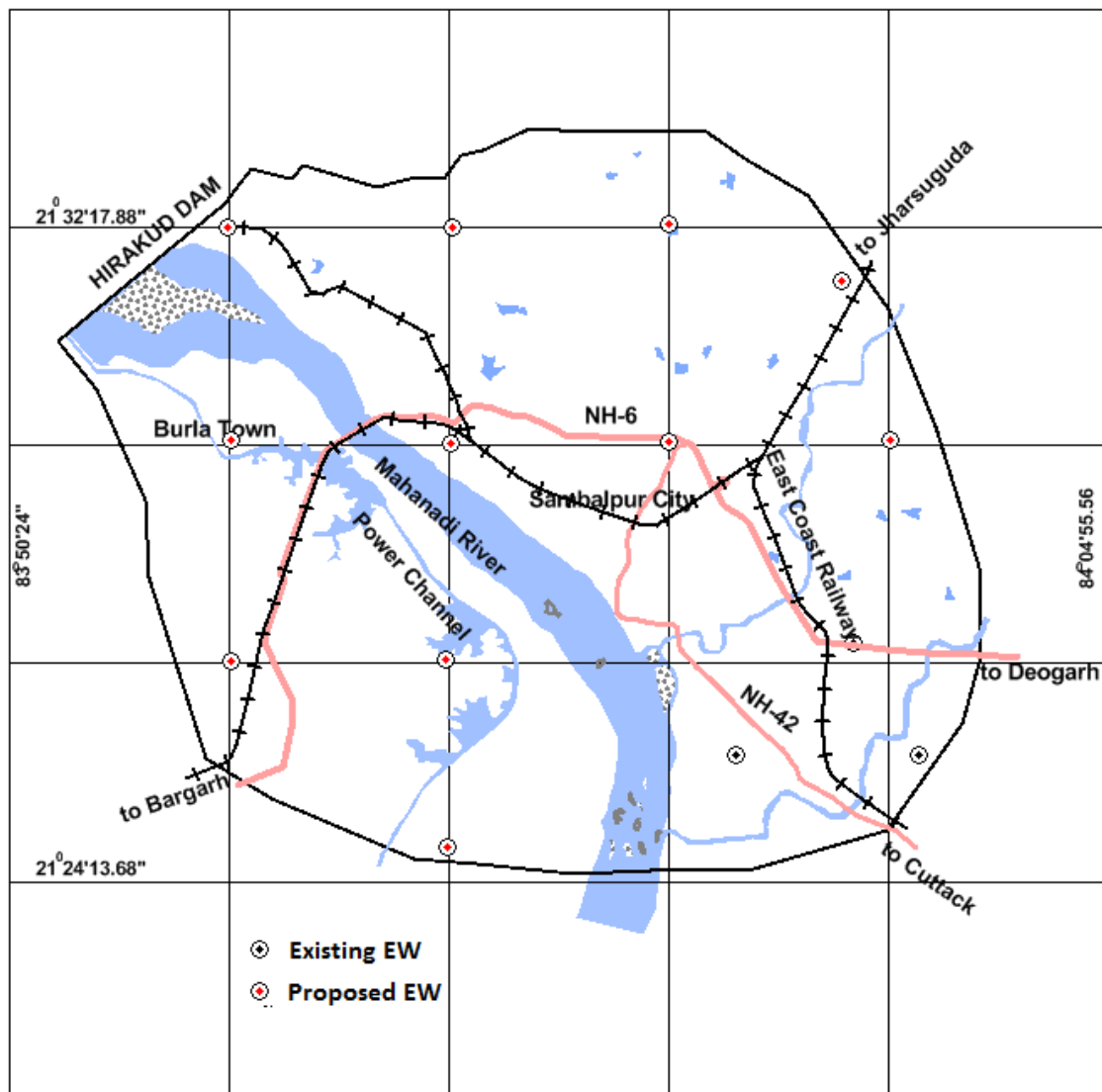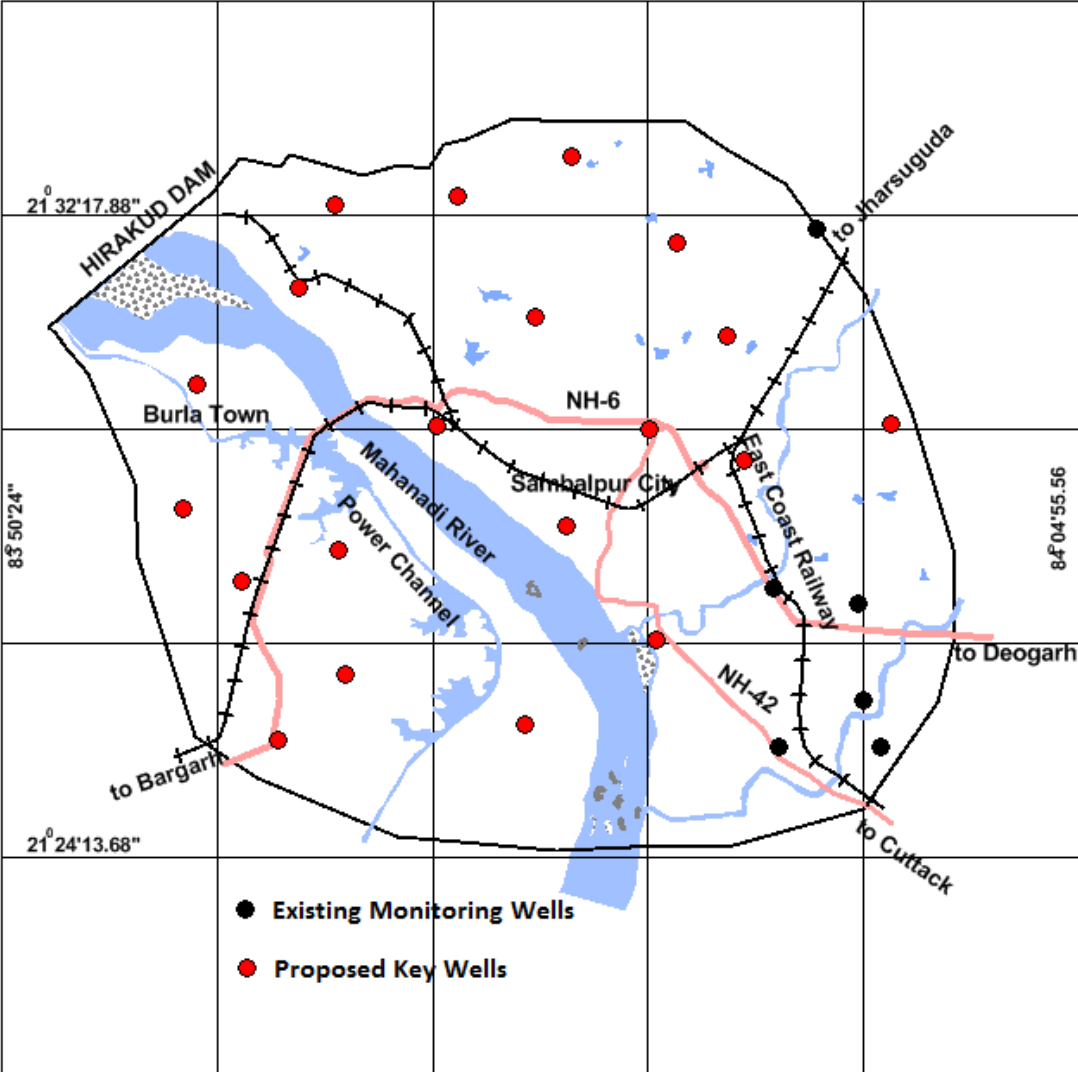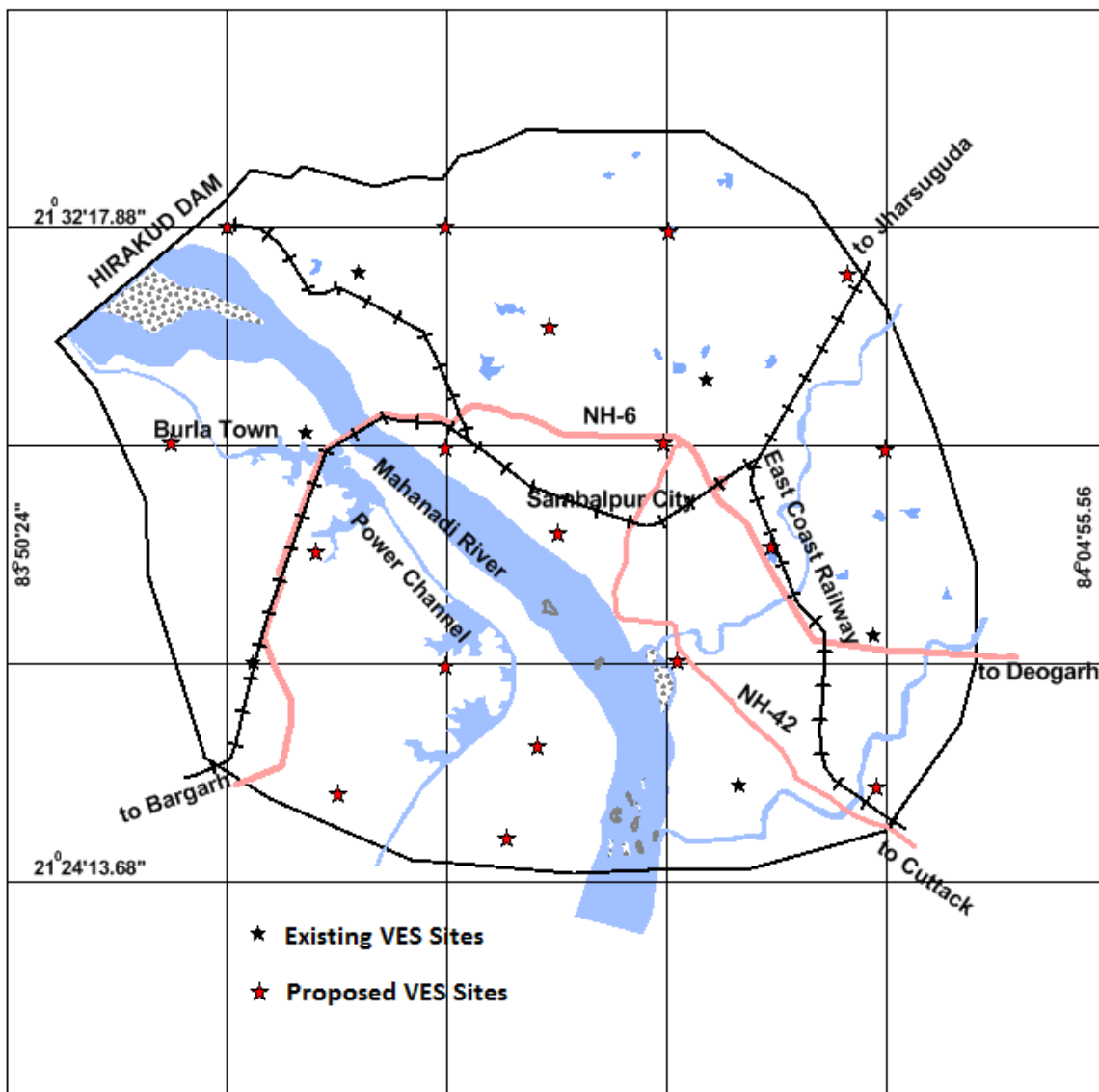
Fig.3.: Proposed Data Generation for the Study Area(Sambalpur Urban and Peri-urban Area)

Fig.4:Proposed Data Generation for the Study area (Sambalpur Urban and Peri-urban Area)

NEW DATA GENERATION PLAN

1. 11 Exploratory Well are to be constructed within the study area.
2. 30 number of key wells (20 dug well and 10 tube well/hand Pump) are to be establish for water level collection during pre and post monsoon time.
3. About 15 number of water samples (ground water and surface water) are to be collected during pre-monsoon, monsoon and post-monsoon time only for heavy metal analysis from nearby industries. 45 number of water samples for basic analysis arealso to be collected as per data gap.
4. 17 number of VES area to be conducted.
5. Groundwater abstraction data are to be collected from irrigation and RWSS wells.
6. To collect groundwater abstraction and quality in different major industrial premises.
7. Collection of data of artificial recharge structure and water conservation structure.
8. Data collection of water supply scheme in the study area.

MONTHWISE ACTIVITY PLAN

Month	Activity to be carried out
08.05.23to 12.05.23	**Base map Preparation & Inception Report** ✓ Area map showing communication network, drainage, important places, existing NHS, existing EW, OW, Pz & DW, Data generated during previous NAQUIM studies and proposed locations for establishment of key wells, Preparation of the Inception Report
12.5.23 to 15.06.23	**Field Data Collection:** ✓ Key well establishment; Water level measurement including geo-coded locations & Water sample collection ✓ Collection aquifer wise data wherever possible. Rigorous monitoring of deeper aquifer is necessary if they are commonly being used for agriculture & Industrial purposes. ✓ Apprising Block level Authorities about the Work Item. Presentation of Inception Report. **Sample Surveys and User Feedback:** ✓ Discussions with farmers and other users at ground level. Collection of information from local agencies or well owners about well depth, slotted zone/fracture zone, discharge (can be measured by the officer,if possible), static water level and random drawdown data, Irrigation Practices, cropping pattern and related information. ✓ Instantaneous discharge measurements along with data on, pump working hour for estimating unit draft. ✓ A sample feedback form is annexed. **Other ongoing field activities** ✓ Exploratory drilling, geophysical studies, data entry in WIMS
16.06.23 to 15.10.23	**Data Analysis and Interpretation** ✓ Compilation & analysis of data collected during pre-monsoon field work ✓ Completion of chemical analysis of samples collected and data validation ✓ Preparation of thematic maps such as pre-monsoon DTW, EC, Cl maps and identification of areas with quantity (deeper water level, declining trend, drying of wells/reduction of discharge) & Quality issues (F, NO3, Fe, As) ✓ Preparation of Location, LULC, Physiography & drainage, DEM, Hydrogeomorphic, Basin, rainfall histogram, Geological maps etc ✓ Preparation of relevant chapters on the themes like Introduction, Physiography &drainage, Hydrometeorology, Hydrology, Landuse Landcover, Geology etc. ✓ Tabulation and correlation of hydrogeological and geophysical data of existing EW, OW, PZ & DW, VES ✓ Preparation of Cross sections (2D) showing aquifer disposition by correlating lithologs. ✓ Conceptual 3D Model (which will be modified after getting more data during post-monsoon studies) ✓ Analysis of lithologs and aquifer properties data of previous studies and their incorporation ✓ Mapping of water bodies from Satellite Imagery and its comparison with topo-sheet for preparation of RWH & AR Plan

	✓ Collection of drilling & other related data from State Govt agencies, Drilling companies & NGOs
16.1023 to 15.12.23	**Field Data Collection** ✓ Post-monsoon water level monitoring ✓ Monitoring of additional wells in areas identified with some issues based on level & quality monitoring data of pre-monsoon ✓ Conducting pumping tests at field in irrigation wells, discharge vs drawdown measurement, quality checking with hand-held EC & pH meter, collection of drilling data from the pump/land owner etc. **Sample Surveys and User Feedback** ✓ Discussion with farmers and other users at ground level. Collection of information from local agencies or well owners about well depth, slotted zone/fracture zone, discharge (monitored wherever possible),static water level and random drawdown data, Irrigation Practices, cropping pattern, traditional water conservation and management practices and related information. ✓ Instantaneous discharge measurements, along with pump working hour information for estimating unit draft. ✓ Similarly, feedback of the local users will form an important input for problem identification and characterization. Feedback are to be obtained in case of Urban areas, Industrial clusters also. Feedbacks on drinking water availability, dependence on ground water etc are also to be obtained. ✓ A sample feedback form is annexed, which can be customized to the type of priority area and objective of the study. **Other ongoing field activities** ✓ Exploratory drilling, geophysical studies, data entry in WIMS
16.12.23 to 15.01.24	**Data Analysis and Draft Report Preparation** ✓ Compilation & Analysis of Post-monsoon data (Statistical analysis based on geology, physiography, etc. can also be attempted) ✓ Chemical Analysis of the post monsoon water samples (collected from selected wells for confirmation of issues) ✓ Preparation of maps and tables- please refer priority area wise deliverables and outputs ✓ Preparation of ground water management plan, analysis of existing practices and proposed measures under Supply side and Demand side measures with the expected impact on ground water system. ✓ Draft Report writing work **Other ongoing field activities** ✓ Exploratory drilling, geophysical studies, data entry in WIMS
16.01.24 to 15.02.24	✓ Field truthing of Management plan & RWH & AR Plan ✓ Final Stage field visit for various field data collection & generation based on the requirement (data gap filling) as observed during draft report preparation **Other ongoing field activities** ✓ Exploratory drilling, geophysical studies, data entry in WIMS
16.02.24 to 15.03.24	✓ Modification of draft report with additional information collected by the field checks ✓ Scrutiny and Finalisation of the Report **Other ongoing field activities** ✓ Exploratory drilling, geophysical studies, data entry in WIMS

16.03.24 to 31.03.24	✓ Sharing of the reports with CHQ, SGWCC and DM/DC ✓ Preparation of Brochure **Other ongoing field activities** ✓ Exploratory drilling, geophysical studies, data entry in WIMS	

Month-wise activity plan includes, field visits, visits to local offices, training, report writing, sharing with the concerned departments, entering data in WIMS, ProgressReporting in MIS, uploading of reports and media in publications warehouse. The month-wise activity plan of team members is given in **Table 1.**

Table 1: Month-wise activity plan

Activity	Assignments to be carried out by officers	Apr-23	May-23	June-23	July-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Base Map Preparation &Inception Report	Sh. Rajeev Kumar Tripathy, Sh. Rajkishore Mohanty,	██											
Key Well Establishment	Sh. Rajkishore Mohanty,		██	██									
Pre-Monsoon Water levelMonitoring	Sh. Rajkishore Mohanty,		██										
Pre-Monsoon Sampling	Sh. Raj kishore Mohanty,		██										
Data Collection	Sh. Rajkishore Mohanty, Shri Rajesh Babu,		██	██	██								
Pre-Monsoon Sample Analysis -Inhouse	Sh. B N Dehury,			██	██	██	██	██					
Pre-Monsoon WQ Data Analysis &Hot Spot Generation	Sh. B N Dehury				██	██	██						
VES	Shri Rajesh Babu,		██						██	██	██		
Pre-Monsoon Map Preparation	Sh. Rajkishore Mohanty,				██	██	██	██					
Post-Monsoon Water levelMonitoring	Sh. Rajkishore Mohanty,								██	██			
Post-Monsoon Sampling	Sh. Rajkishore Mohanty,								██	██			

Activity	Assignments to be carried out by officers	Apr-23	May-23	June-23	July-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Data Collection	Sh. Rajeev Kumar Tripathy, Sh. Rajkishore Mohanty, Shri Rajesh Babu, Sh. B N Dehury								■	■	■		
Post-Monsoon Sample Analysis-Inhouse	Sh. B N Dehury,									■	■	■	
Post-Monsoon WQ Data Analysis	Sh. B N Dehury,											■	
Post-Monsoon Map Preparation	Sh. Rajkishore Mohanty,											■	
Geophysical Data Analysis& Map Preparation	Shri Rajesh Babu,				■	■	■	■			■		
Data Entry in WIMS	Sh. Rajkishore Mohanty,		■	■	■	■	■	■	■	■	■	■	
Ground Water Exploration (Drilling) - Inhouse / Outsourcing	Sh. Rajkishore Mohanty,			■	■	■	■	■	■	■	■	■	
Aquifer Parameter Tests	Sh. Rajkishore Mohanty,				■	■	■	■	■	■	■	■	
Interaction with Farmers/ Stakeholders	Sh. Rajeev Kumar Tripathy, Sh. Rajkishore Mohanty,								■	■	■	■	■
Report Preparation	Sh. Rajeev Kumar Tripathy, Sh. Rajkishore Mohanty,						■		■	■			
Draft Report Submission	Sh. Rajeev Kumar Tripathy, Sh. Rajkishore Mohanty,											■	■
Final Report Submission	Sh. Rajeev Kumar Tripathy, Sh. Rajkishore Mohanty,												■

COMPOSTION OF THE TEAM

1. Sh. Rajeev Kumar Tripathy, Scientist-C (Lead Hydrogeologist))
2. Sh. Rajkishore Mohanty, Scientist-B (Hydrogeologist and Field Officer)
3. Sh. B N Dehury, Assistant Chemist (For field sampling and analysis)
4. Smt Bindu Singh , Assistant Geophysicist (For VES survey)

TEAM MEMBERWISE RESPONSIBILITIES AND MONTHLY TARGETS

Role	Responsibilities	Indicative Designation
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. - Please refer the table on priority area wise deliverables and outputs for further details	Hydrogeologist
Expert (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 - SecondaryDatacollection - Enteringdataindatabase(WIMS) - Integration of data, preparation of thematic maps, preparation crosssectionsetc. - Consultation with allied experts like agriculture, irrigation, agro-economicsetc. - Preparation of Management Plan - Assisting the Team Lead in preparing maps and reports. - All Officers should work in GIS and try to prepare maps on their own. - Please refer the table on priority area wise deliverables and outputs for further details	Hydrogeologist
Expert (Geophysics)	- Field Geophysical Surveys - Interpretationof fielddata - Entering data in database(WIMS) - Integration with existing geophysical and lithology data - Preparation of inferred lithologs - Suggesting potential sites for construction of water wells/artificialrecharge - Preparation of Tables, graphs and maps for reports - Assisting the Team Lead in preparing the Report - Please refer the table on priority area wise deliverables and outputs for further details	Geophysicist

| Expert (Hydrochemistry) | - Sample collection for quality studies
- Analysisofsamples.
- 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
- Please refer the table on priority area wise deliverables and outputs for further details | Chemist |