

INCEPTION REPORT ON BHOPAL URBAN AGGLOMERATE
NAQUIM 2.0
AAP: 2023-24
NORTH CENTRAL REGION, BHOPAL

1. **About the study area:** Bhopal, the capital city of Madhya Pradesh is also known as the City of Lakes.

1.1 Location

Bhopal urban is spanning over an area of about **425 sq km**, lies in the southern part of the Bhopal district. It comes under administrative boundary of Phanda block. Bhopal urban area lies between North latitude **23° 04'** and **23° 24'** and east longitude **77 ° 10 '** and **77 ° 40 '**, falling in Survey of India Topo sheet No. **55 E/3, E/4, E/7, E/8, E/11 & E/12**. Bhopal city is the district as well as state head quarter. The district is surrounded by Guna district in the north, Vidisha district in the northeast, Raisen district in the east and Sehore and Rajgarh district in the southwest and west respectively.

1.2 Geology

The rocks of the Vindhyan Super Group (Bhander red sandstone) are exposed in the southern, southeastern and eastern part of the area. The Deccan trap basalts occur in the western and northern part of the area as lava flow in fillings in the valleys of pre-existing Vindhyan topography. Localized patches of alluvium cover occur along the banks of major and minor rivers and streams in the southeastern part.

1.3 Drainage

The district is drained by river Betwa with its main tributaries like Kaliasot, Kerwa, Halali and Kolans. The major Streams are flowing in south eastern and central direction. The major and minor streams shows dendritic and sub parallel drainage pattern.

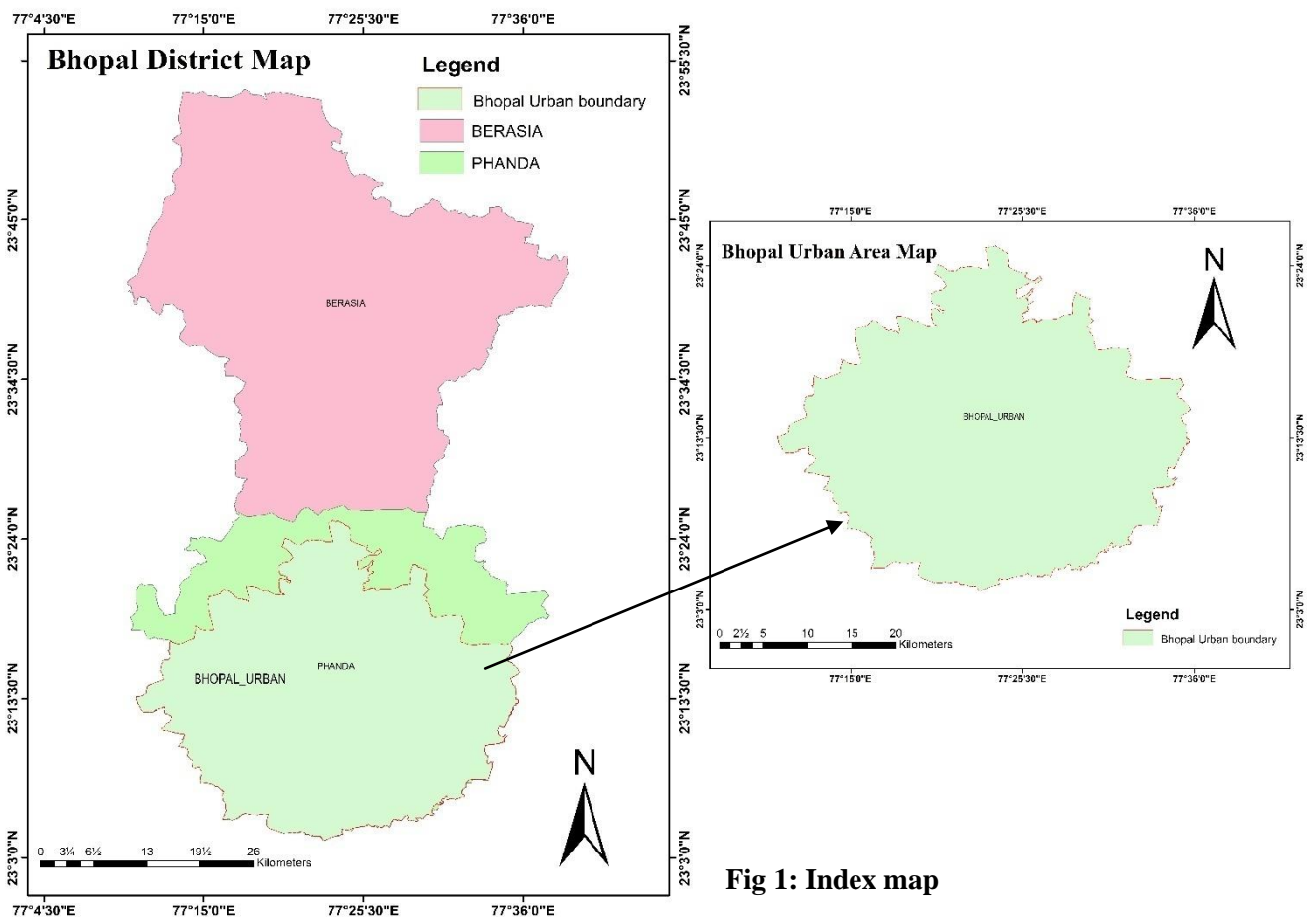


Fig 1: Index map

1.4 Geomorphology, Soil and Rainfall

Elevation in the area varies from 625 m to 370 m amsl. Almost three-fourths area is covered with black cotton soils formed by the weathering of basaltic rocks. The rest part of the area is covered with yellowish-red, mixed soils derived from sandstone and shale. The alluvial soils are found along the river courses. IMD normal annual rainfall of Bhopal city is 1070 mm.

2. **Priority types:** Bhopal urban Agglomerates, study of declining water level due to urbanization and study of water quality with emphasis on arsenic and heavy metals.
3. **Previous Studies:** National aquifer mapping and management plan of Phanda block has been prepared by Mr. D. Joshi (Retrd. Sc-D) in year 2016. District brochure of Bhopal district prepared in year 2013. As per dynamic ground water resource assessment report **2022** Bhopal urban agglomerate has a stage of extraction **71.13%** i.e, it comes under **Semi-critical** category. Kori et.al., 26.10.2019, Study of Ground Water Quality of Bhopal City, Madhya Pradesh, India. International Journal of Current Research. DO - 10.24941/ijcr.36871.10.2019

4. Issues :

- a) Nitrate concentration is more than permissible limit as per BIS standard in 2 locations i.e. Islamnagar and Sarvar as per data from regional chemical lab NCR Bhopal-2021 and 2022.
- b) High contamination in ground water observed in North eastern part of Bhopal as reported by Kori et.al., 26.10.2019
- c) Declining water level observed in last 10 years of hydrographs of 2 locations and same is noticed by DC of Bhopal as per their order dated 24.04.2023
- d) Water logging condition in the 4 stations of Bhopal city observed as per water level monitoring of 2021 post monsoon where the water level ranges from 0.7 to 2 mbgl.

5. Objectives of the present study:

Keeping the ground water quality and other issues in focus, following are the objectives of present study.

1. Aquifer Dispositions
2. Aquifer-wise ground water Level monitoring
3. Delineation of Recharge Areas and Artificial Recharge Plan
4. Estimation/Refinement of parameters used for resource assessment
5. Assessment of ground water resources
6. Ground Water Quality and Management Interventions including demarcation of safer aquifers
7. Areas showing signs of subsidence if any
8. Identification of potential aquifers for drinking water supply
9. A plan for drinking water source sustainability
10. Recommendations for tackling water logging
11. Water sampling and analysis near garbage dump sites

6. Existing data:

There are 09 exploratory wells (04 in outsourcing (2019) and 05 from In-house) are constructed in the area of mapping and 37 VES (2012-2015-2019) has been conducted in the urban area. 14 Dug-wells and 03 Piezometers are monitoring for ground water level in urban area.

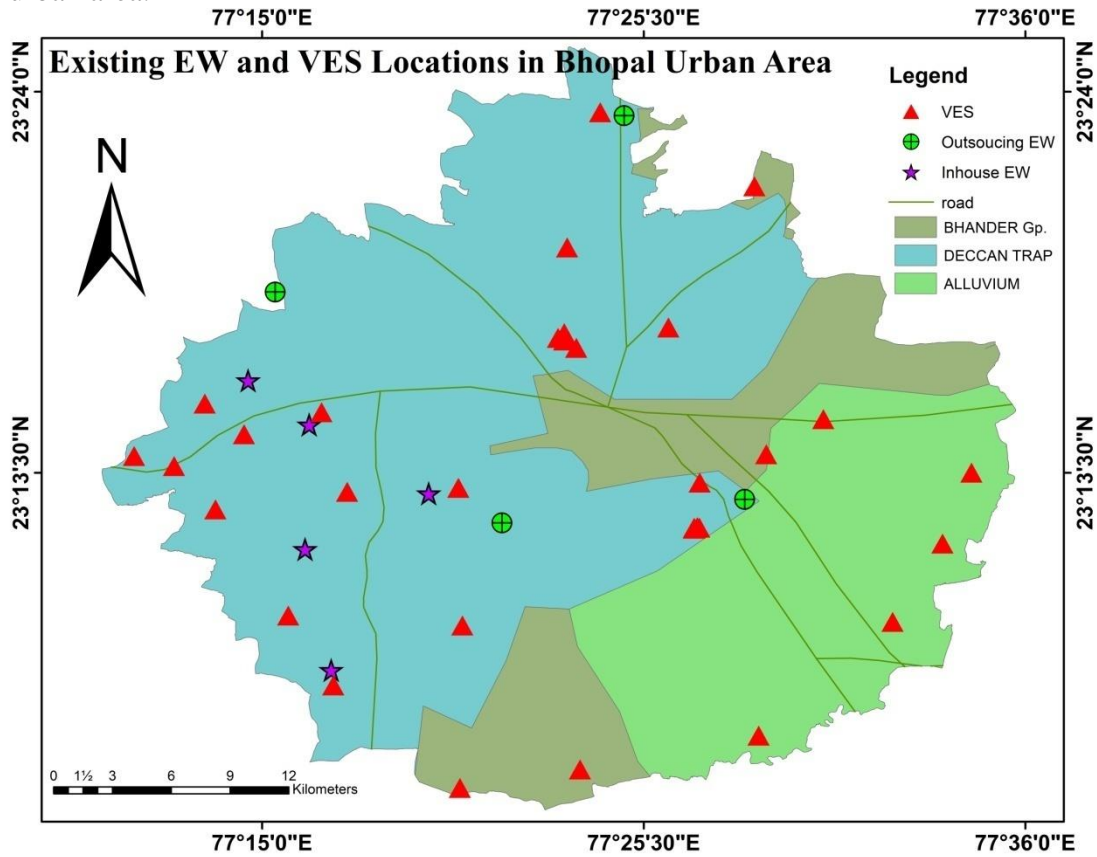


Fig. 2. Existing Data

7. Data gap analysis:

47 sites has been proposed under PIB for construction of EW and Pz and apart from this 5 EW/OW and 5 Pz proposed in data scarce area under NAQUIM 2.0 as shown in fig 3.

		Saumya Sidhhartha, STA												
13	Ground Water Exploration (Drilling) - Inhouse / Outsourcing	Paisnee Patel, Sc-C Kamlesh Ojha, Sc-B Saumya Chaudhary, Sc-B												
14	Aquifer Parameter Tests	Paisnee Patel, Sc-C Kamlesh Ojha, Sc-B Saumya Chaudhary, Sc-B												
15	Rainfall Infiltration Test	Paisnee Patel, Sc-C Kamlesh Ojha, Sc-B Saumya Chaudhary, Sc-B												
16	Farmer/Us er Feedback	Kamlesh Ojha, Sc-B Saumya Chaudhary, Sc-B												
17	Field Verification of Ground Water Management Plan, RWH and AR Plan	Paisnee Patel, Sc-C Kamlesh Ojha, Sc-B Saumya Chaudhary, Sc-B												
18	Report Preparation	Paisnee Patel, Sc-C Kamlesh Ojha, Sc-B Saumya Chaudhary, Sc-B Tej Singh, ACH Saumya Sidhhartha, STA												
19	Draft Report Submission	Paisnee Patel, Sc-C												
20	Final Report Submission	Paisnee Patel, Sc-C												

9. Month-wise activity plan – field visits, visits to local offices, training, report writing, sharing with the concerned departments, entering data in WIMS, Progress Reporting in MIS, uploading reports and media in publications warehouse.

Teams	Month	Activity
Team Lead Paisnee Patel (Sc-C)	April	Data Gap Analysis and Preparation of Inception Report Meeting with Bhopal urban commissioner regarding proposed site selection in urban areas
	May	Data Gap Analysis and Preparation of Inception Report Establishment of KOWs Pre monsoon Water Level Monitoring and Sampling (KOWs+NHS)
	June	Establishment of KOWs Pre monsoon Water Level Monitoring and Sampling (KOWs+NHS) Pre-Monsoon WQ Data Analysis & Hot Spot Generation
	July	Pre-Monsoon WQ Data Analysis & Hot Spot Generation
	August	Pre-Monsoon WQ Data Analysis & Hot Spot Generation
	September	Data Analysis and Interpretation
	October	Preparation for Midterm Workshop 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) Kamlesh Ojha, Sc-B Saumya Chaudhary, Sc-B	April	Data Gap Analysis and Preparation of Inception Report Meeting with Bhopal urban commissioner regarding proposed site selection in urban areas
	May	Data Gap Analysis and Preparation of Inception Report Establishment of KOWs Pre monsoon Water Level Monitoring and Sampling (KOWs+NHS)
	June	Establishment of KOWs Pre monsoon Water Level Monitoring and Sampling (KOWs+NHS) Pre-Monsoon WQ Data Analysis & Hot Spot Generation

	July	Pre-Monsoon WQ Data Analysis & Hot Spot Generation Consultation with Allied Experts of Agriculture, Irrigation and economics etc. Secondary data collection from different State Departments.
	August	Pre-Monsoon WQ Data Analysis & Hot Spot Generation Data entry in WIMS and other ongoing field activities.
	September	Data Analysis and Interpretation. Consultation with Allied Experts of Agriculture, Irrigation and economics etc. Secondary data collection from different State Departments.
	October	Preparation for Midterm Workshop 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	Consultation with Allied Experts of Agriculture, Irrigation and economics etc. Preparation of Draft Report and other ongoing field activities.
	February	Consultation with Allied Experts of State GW dept., Agriculture, Irrigation and economics etc. Secondary data collection from different State Departments. 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 (Geophysics) Saumya Sidhhartha, STA	May
June		VES/TEM
July		Data interpretation. Integration of existing Geophysical and lithology data and selection of sites suitable for drilling. Data entry in WIMS.
August		Data entry in WIMS and other ongoing field activities.
September		Validation and Interpretation of data. Integration of existing Geophysical and lithology data. Preparation of inferred lithologs. Preparation of tables, Graphs and maps for the reports.
October		VES/TEM

	November	Field Data Collection and preparation of Management Plan and other ongoing field activities.
	December	Field Data Collection and Data entry in WIMS
	January	Preparation of Draft Report and other ongoing field activities.
	February	Field Truthing of Management Plan.
	March	Sharing of the reports with CHQ, SGWCC and DM/DC and other ongoing field activities.
Expert (Hydro chemistry) Tej Singh, ACH	May	Pre monsoon Water Level Monitoring and Sampling (KOWs+NHS)
	June	Pre monsoon Water Level Monitoring and Sampling (KOWs+NHS) Pre-Monsoon Sample Analysis (In-house) Pre-Monsoon WQ Data Analysis & Hot Spot Generation
	July	Pre-Monsoon Sample Analysis (In-house) Pre-Monsoon WQ Data Analysis & Hot Spot Generation
	August	Pre-Monsoon Sample Analysis (In-house) Pre-Monsoon WQ Data Analysis & Hot Spot Generation
	September	Analysis and Interpretation of data. Preparation of tables, Graphs and maps for the reports.
	October	Preparation for Midterm workshop 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.

10. Composition of the team.(with responsibilities)

Sr. no.	Officers assigned		Target
1.	Paisnee Patel (Sc-C)	Team Leader	<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. - 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.
2.	Sh. Kamlesh Ojha, Sc-B	Hg-1	Site selection of EW/OW- 5, Pumping/ Slug/PYT test- 10
3.	Ms. Saumya Chaudhary, Sc-B	Hg-2	Site selection of Pz-5 Water Level Measurement - 120 (60*2 times), Water Sample collection- 320 (80*2+80*2)
4.	Sh. Tej Singh, ACH	Chemist	Analysis of Groundwater for Basic parameters -160 and Analysis of Groundwater for Heavy Metals and Other Parameters 160, of pre-and post-monsoon season.
5.	Ms. Saumya Sidhartha, STA	Geophysicist	VES-30