Government of

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Shakti

Department of Water Resources, River

Development & Ganga Rejuvenation

Central Ground Water BoardWestern

Region Jaipur

Inception Report National AquiferMapping & Management Plan (NAQUIM 2.0)

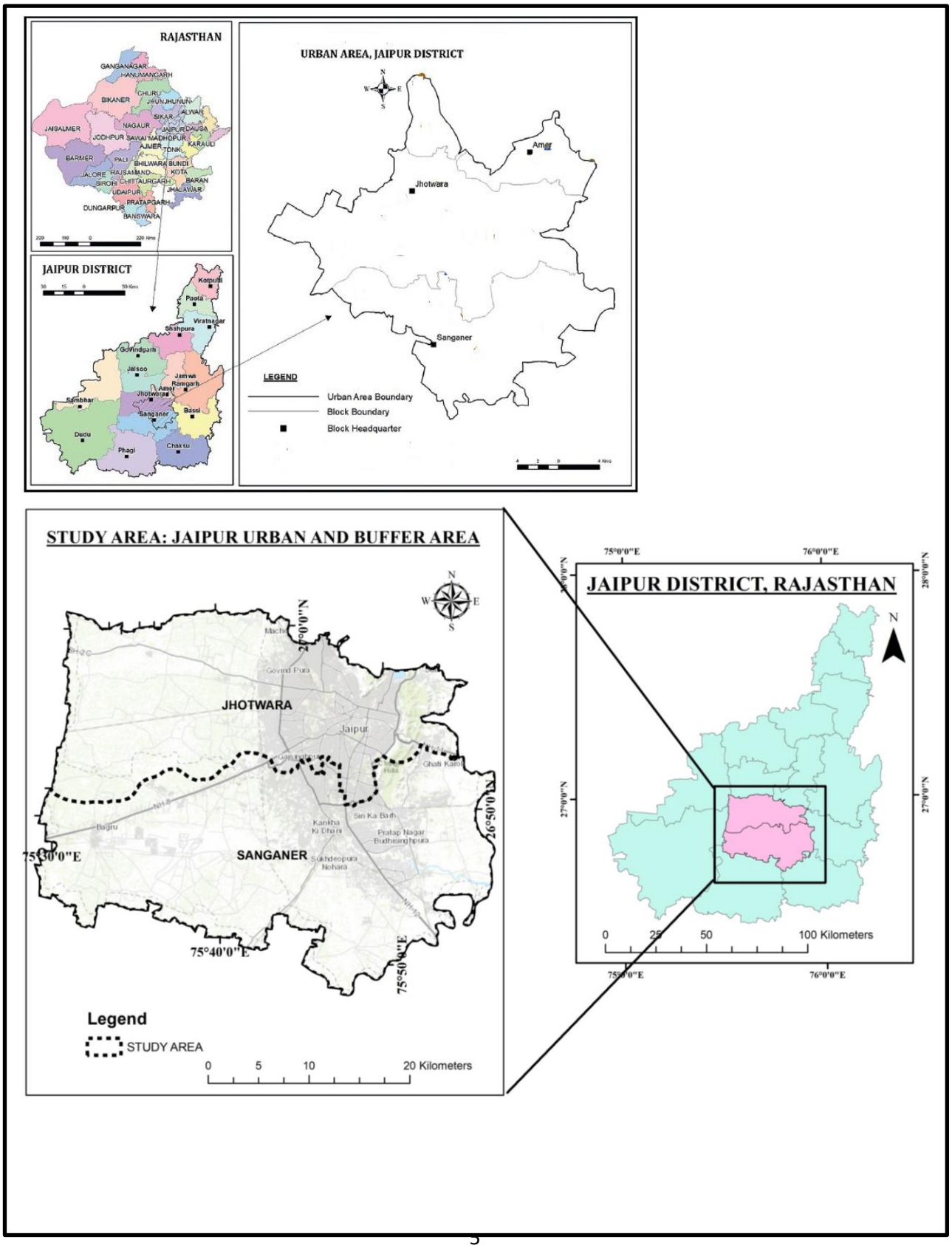
Jaipur Urban Cluster, Rajasthan

Table of Contents

Month Wise Activity Plan	
Roles and Responsibility of Individual Team Members	

List of Annexures	
I	List of Pz monitored by CGWB:
II	List of Pz monitored by GWD
III	List of Exploratory wells (NAQUIM Outsourcing-Package-3)

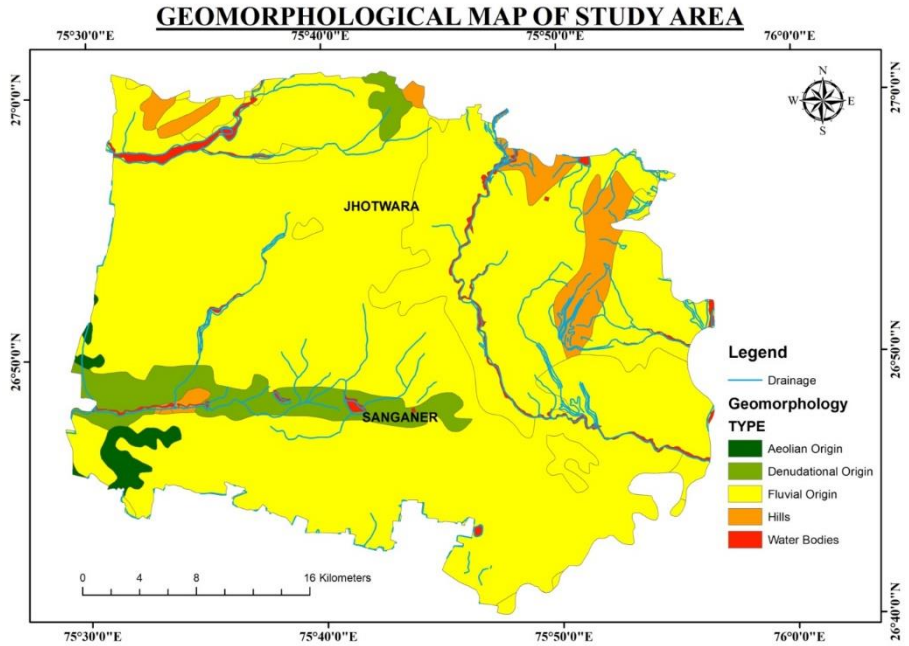
Introduction



Jaipur city was founded by Sawai Jai Singh in the year 1723. The areal extension of Jaipur Urban area is between North latitudes 26°47'-27°02' and East longitudes 75°36' – 75°55' (located almost in the centre of the district and covers an area of about 470 sq. km. The Jaipur agglomerate has parts of Sanganer(45.5%), Jhotwara (42.5%) and Amer (12%) blocks. Jhotwara block which constitutes the major part of the urban city has a population density of 2745 persons/sq.km. With the increase in the rate of urbanization thepopulation of the city also increased many fold during the last 6 decades

Geomorphology:

It is characterized by wide spectrum of landscapes of aeolian, denudational and fluvial origin. Structural hills occur as linear to arcuate uplands trending in a NNE-SSW direction with varying lithology associated with folding, faulting etc can be observed to occur mainly in the northern and eastern parts of the district. Denudational landforms comprise pediment, buried pediment and intermontane valleys. The pediments are represented by broad, gently sloping erosional surface of low relief between hills and plains, comprised of varied lithology, criss-crossed byfractures and faults. Pediments are often buried beneath relatively thick alluvial, colluvial or weathered materials.



The general topographic elevations in the district are between 300 m and 400 m above meansea level.

Drainage

The district is drained by Sabi, Banganga, Bandi, Mendha, Mashi and Sota rivers and their tributaries which all are ephemeral in nature. Sota and Sabi rivers in the northern part of district flow northeasterly while south-westerly flowing Banganga river passes through Shahpura, Viratnagar and Jamwa Ramgarh blocks and contribute water to the famous Ramgarh lake from where it flows easterly to enter Dausa district. Mendha River in north- west portion of the district merges with famous Sambhar lake whereas Mashi River in the south-western part flows easterly.

Climate and Rainfall:

The climate of Jaipur district is semi arid with harsh summers and very cold winter season. The northern and eastern part of the district falls on the eastern extreme of Great Thar Desert with normal annual rainfall of 527 mm.

Soil:

The major area is alluvial sandy loam in texture especially the eastern half of the district. The western half is occupied by desert and seriozem soil types. Hills have lithosols and regosols whereas foothills have yellowish brown soils. Agriculture activity in the district is, by and large, confined to traditional kharif cultivation depending on monsoon rainfall and rabi cultivation is prevailing in areas where irrigation facilities are available.

Geology:

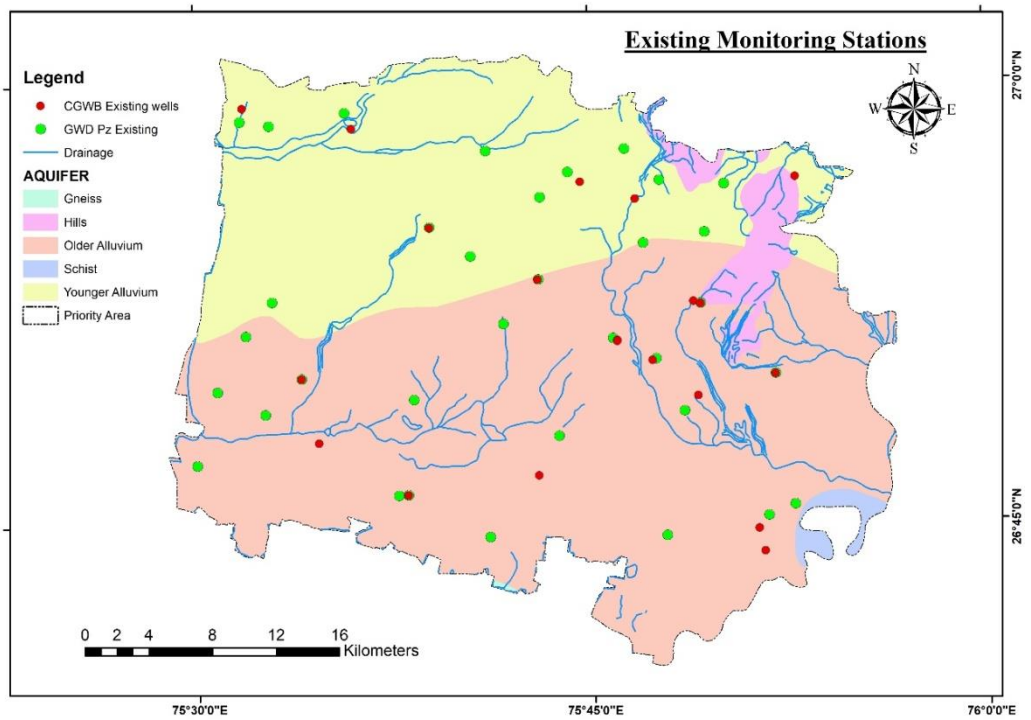
Geologic succession of Jaipur district is quite wide ranging in terms of age and rocks from Archean to Recent age. Most of the north eastern part of the district is covered by younger and older alluvium which is predominantly sandy to clayey in nature.

Super Group	Group	Formation
	Recent to Sub recent	Sand, Clay, Clay Kankar
Post Delhi		Granite, Pegmatite, amphibolites (intrusive)
Delhi	Ajabgarh	Schists, Phyllites, Marble and Quartzite
	Alwar	Quartzite, Conglomerate and Schists
	Raialo	Dolomitic marble and Quartzite
x x x x Unconformity x x x x-		
Bhilwara		Gneisses, Schists and Migmatites

Hydrogeology

The hydrogeological framework is essentially controlled by geological setting as circulation and movement of groundwater is controlled by the interconnected primary and secondary porosities of the geological formations constituting the aquifers.

The Quaternary alluvium forms the principal and potential aquifer. It is composed of clay, kankar, silt, sand, gravel and pebbles. Gravel and pebbles are found in local patches near hilly catchments and in buried river channels.
The hard rocks viz. quartzites, schist limestone of Delhi Supergroup and granitic gneiss of Bhilwara Super Group do not form the good aquifer except where they are highly jointed, fractured and weathered.



Previous Work carried out by CGWB in the district:

1. NAQUIM Study: "Aquifer Mapping and Management Plans" for the district report was authored by Sh. S. S Saraswat, Sc-D(Hg)in year 2017, the report was further updated by Smt. Priya Kanwar, Sc-D(Hg) in year 2022. Both the reports have been published and are available at CGWB Official website.
2. Special Studies : Groundwater Quality Senario in Jaipur Rural and Urban Areas, Rajasthan authored by Smt. Aruna Saini, ACH, CGWB,WR, Jaipur.
3. Publications: Groundwater Scenario and Management options in Jaipur Urban Area , Rajasthan by P.K Parchure, Regional Director, CGWB,Wr Jaipur and Aruna Saini, Chemist, CGWB, WR Jaipur.
4. Publication: A Study of Impact of progressive urban expansion on groundwaterquality by suing graphical, statistical and WQI methods, Jaipur, Rajasthan.
5. Dynamic Groundwater Resources Report, 2022, CGWB, WR, Jaipur.
6. Chemical Quality Studies in Industrial/Urban Clusters- Jaipur Urban cluster

Main Issues identified in the Jaipur Urban Area:

- **Urbanization** has resulted in Population explosion and subsequent **change in hydrologic cycle** – shrinkage & pollution of surface water bodies, ground water resources and water pollution.
- Urbanization resulted in **point and non-point sources of pollution**
- Urbanization **disturbed the ground water recharge component** by increasing impermeabilization and ground sealing
- **Increased per-capita use resulting in increased gap in Demand and supply. (**The earlier source of surface water was Ramgarh lake, which has been dried up and now surface water is transferred through pipe line from Bisalpur Dam on Banas River located about 120 km. from Jaipur. Large scale ground water development due to urbanization and industrialization has rendered Jaipur urban area ground water system as over exploited with stage of ground water development as 474.96% in Jhotwara Block and 272.49% in Sanganer Block.)
- **Industrial clusters and related pollution**
- **Geogenic Pollution**: Fluoride, nitrate, uranium
- **Anthropogenic Pollution**: High generation of waste **as a result of rapid increase in population and absence of sewage network.**
- **Change in Cropping Pattern** and decrease in agricultural area over the years.

Approach and Methodology

Objectives:

- Preparation of base map using watershed as the boundary and highlighting the issues in the study area
- Literature Survey: collecting all available data and generating existing data base
- Identifying issues based on already available data and also in consultation with the state authorities
- Refer the methodologies followed in national and international studies to solve the issues
- Prepare time frame for each activity
- Collating the existing data: Data generated by CGWB, State Govt & Research Institutions
- Select the Grid size for each theme based on the objective of study.
- Data Gap Analysis on the basis of existing data available.
- Quantifying Existing Demand – Supply with dependence to Ground Water / Surface Water to be quantified and identification of the Gap
- Identification of site-specific recharge areas.
- Identification of potential areas which could be used as source for drinking purpose.
- To demarcate areas that are highly prone to ground water quality issues due to urbanization and industrialization based on Water Quality Index.
- Estimate grey water production of Industrial and Domestic sector. Recommend ETP/STP and proper site for utilisation.

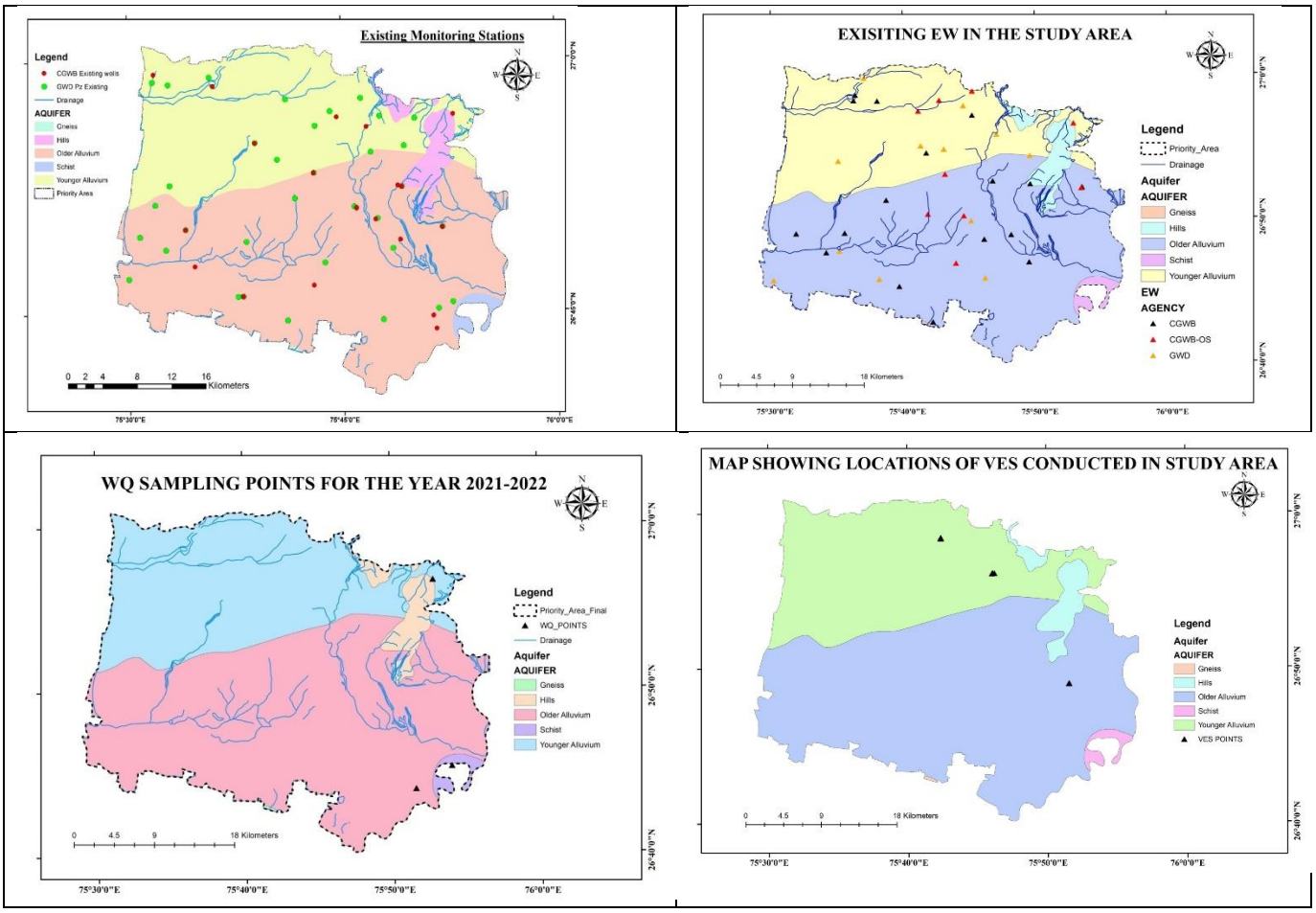
Deliverables

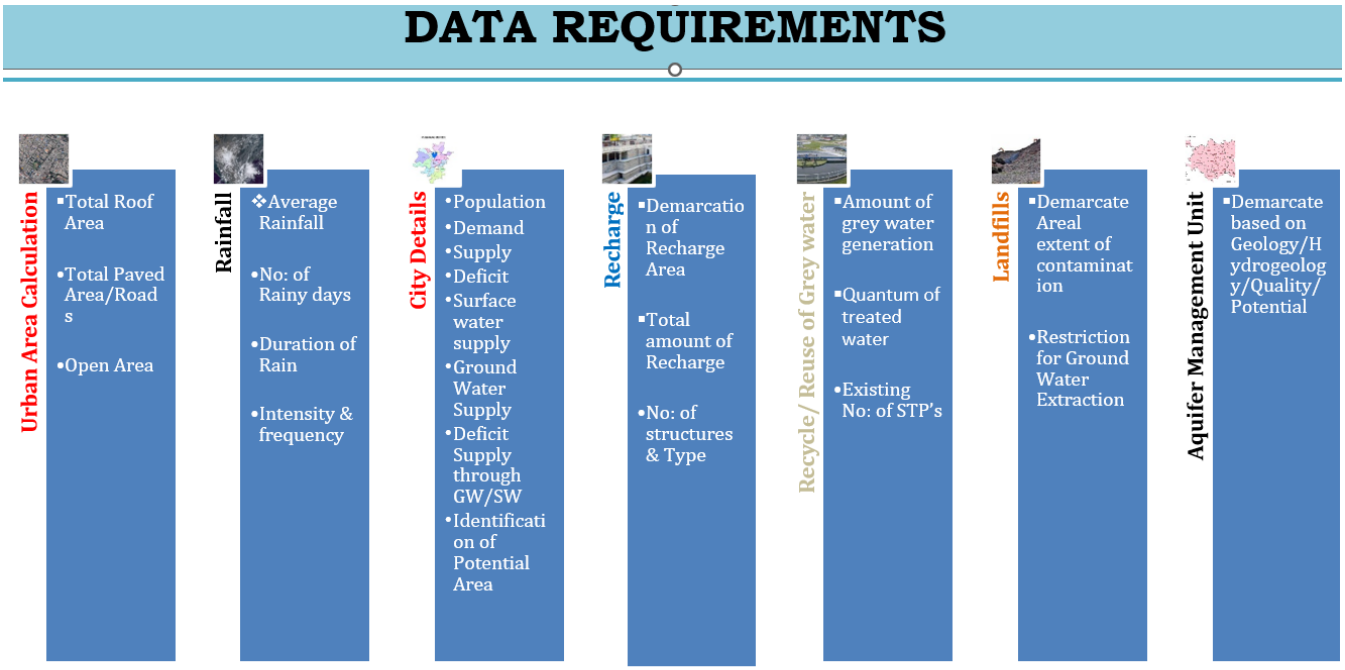
- Aquifer Disposition
- Aquifer-wise ground water Levels
- Delineation of Recharge Areas
- Estimation/Refinement of parameters used for resource assessment
- Assessment of ground water resources
- Ground Water Quality
- Areas showing signs of subsidence
- Interventions including demarcation of safer aquifers
- Artificial Recharge Plan
- Other measures
- Identification of potential aquifers for drinking water supply
- A plan for drinking water source sustainability

- Recommendations for tackling water logging
- Demarcation of the study area into Aquifer Management Units.

Existing Data availability:

	CGWB	SGWB
Monitoring Wells	20	34
EW	21	8
VES/TEM	4	
WQ sampling points	4	





Composition of Team:

Team Lead	Ms. Nupur Pant, Sc-B(Hg)
Hydrogeologist	Ms. Nupur Pant, Sc-B(Hg)
Hydrogeologist	Sh. Irfan Ali, AHG
Geophysicist	Smt. Sunita Devi, Sc-B
Chemist	Ms. Shivani Shukla, STA

Month Wise Activity Plan

Sr No.	Activity	Months (April to March)											
		Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
A	HYDROGEOLGY												
1	Compilation of available data and	■	■										
2	Preparation of base maps	■	■										
3	Identification of data gap and planning for data generation	■	■										
4	Preparation of Inception report	■	■										
5	Field work for establishment of key wells, pre-monsoon water level monitoring and groundwater sampling.		■	■									
6	Field work for additional data and information					■	■	■					
7	Post-monsoon WL monitoring from key wells and groundwater sampling								■	■			

8	Final Stage field visit for various field data collection & generation based on the requirement (data gap filling) as observed during draft report preparation												
B	GW EXPLORATION												
9	EW Data gap identification												
10	Site selection for drilling												
11	Attending Drilling, preparation of lithologs, Conducting Pumping test												
12	Preparation of Basic Data Report												
C	GEOPHYSICAL STUDIES												
13	Data gap identification for VES/TEM												
14	Field work -VES/TEM												
15	Analysis and interpretation of VES/TEM data												
C	CHEMICAL ANALYSIS												
16	Analysis of sample collected during pre-monsoon												
17	Analysis of sample collected during post-monsoon												
18	Analysis of samples collected during exploration												
D	FIELD TRUTHING AND PREPARATION OF AQUIFER MAPS, MANAGEMENT PLANS												
19	Compilation of data and preparation of GIS based maps and management plans												
20	Report Preparation												
21	Field Truthing of Management Plan												
22	Modification of Draft report. Scrutiny and Finalisation of the report												
23	Sharing of the reports with CHQ, DM/DC												

Roles and Responsibility of Individual Team Members

Role	Responsibilities
Team Lead and Expert (Hydrogeology)-1 (Ms. Nupur Pant) Sc.B	- 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. - 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

Expert (Hydrogeology)-2 (Shri.Irfan Ali) AHG	- 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
Expert (Geophysics) Smt. Sunita Devi , Sc-B (G.P)	- 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
Expert (Hydro chemistry) Ms. Shivani Shukla, STA	- 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

Annexure-I

List of Pz monitored by CGWB:

DISTRICT	BLOCK GEMS	VILLAGE	TYPE	AGENCY	LONG	LAT	MP	DEPTH	FORMATION	Location
JAIPUR	Sanganer	Barkabalaji	PZ	GWD	75.6333	26.7667	1.1	110	Older Alluvium	Back Side of Balaji Temple & inCrimiation Ground
JAIPUR	Sanganer	Bilwa Pz	PZ	GWD	75.855	26.7458	1	71.5	Older Alluvium	In Front of Atal Sewa Kendra, opposite Siddharth Institute of Technology inside Village about 1 km from Jaipur-Chaksu road.
JAIPUR	Jhotwara	Bindayaka	PZ	GWD	75.6486	26.9183	1	112	Younger Alluvium	In the Premises of Govt. Primary School.
JAIPUR	Jhotwara	Budhpura_IMD	PZ	CGWB	75.8175	26.8214	1	67	Older Alluvium	Sanganer Airport to Budhpura road after Cheel Gadi Restaurant.
JAIPU	Jhotwa	CGWB	PZ	CGWB	75.815	26.875	1	71.2	Older	CGWB Campus Jaipur

R	ra	Campus Jaipur			3				Alluvium	
JAIPUR	Sanganer	Chirota	PZ	CGWB	75.5772	26.7969	1	30.5	Older Alluvium	On Kalwada Saganer road to Bagru in Gochar Land in Industrial area, in front of village gate160 mts on Kalwada road
JAIPUR	Sanganer	Dahmi Kallan	PZ	GWD	75.5667	26.8333	1.1	90	Older Alluvium	in the Play Ground of Govt. Higher Sec. School
JAIPUR	Jhotwara	DURGAPURA	PZ	CGWB	75.7889	26.8417	1	100	Older Alluvium	In the campus of Durgapura Agriculture Farmon Tonk road.
JAIPUR	Jhotwara	Gwd Campus	PZ	GWD	75.8197	26.8736	1	112	Older Alluvium	In Front of A. En. Office, GWD Campus Jhalan Dungri
JAIPUR	Jhotwara	Harmara	PZ	GWD	75.7583	27.0106	0.3	125	Younger Alluvium	In front of Crimiation Ground and LHS on roadto Nidar road on 1/2 km from turn.
JAIPUR	Jhotwara	Heerapura	PZ	GWD	75.7169	26.8881	1	106	Older Alluvium	Left side of School adjoining temple in front ofHouse No. 58A and 17 near Govt. Middle

										School Dhawas Heerapura.
JAIPUR	Jhotwara	Jaisingpur Khor	EW	CGWB	75.8806	26.9448	0.5	200	Younger Alluvium	The site is located near play ground of Secondary School Jaisingpura Khor in the Govt. land. The approach of the site is from Jaipur-Agra Highway about 2 Km before Kanota LHS diversion from village Jhamdoli- Jaisinghpura-Khor road.
JAIPUR	Jhotwara	JHOTWARA1	PZ	CGWB	75.7444	26.9433	0.6	85.04	Younger Alluvium	About 1 km NW of Jhotwara village, opposit Joshi's Bunglow on Joshi Marg(bifurcation from Jaipur-Kalwad road), Sanjay Nagar, Kalwad road.
JAIPUR	Jhotwara	KALWAD	PZ	GWD	75.6	26.975	0.9	100	Younger Alluvium	RHS of Jhotwara-Kalwad road, infront of Mitheswar Mahadev Temple opp. Vivek P.G. Mahavidhayalya.

JAIPUR	Jhotwara	Lalpura	PZ	GWD	75.5308	26.9872	1	120	Younger Alluvium	Near Indian Oil Petrol Pump Kalwad to Jobner on Road.
JAIPUR	Jhotwara	Mahal	PZ	GWD	75.8667	26.8333	1.1	105	Older Alluvium	In Side the Campus of Suresh Gyan Vihar University RHS of Entrance Main Gate
JAIPUR	Jhotwara	MANSAROVAR GWD	PZ	CGWB	75.7667	26.8528	1	79	Older Alluvium	Adjacent to Sector 8 Overhead tank, opposit to House No. 80/432.
JAIPUR	Jhotwara	Mansarovar Cgwb	PZ	CGWB	75.7667	26.8533	1	100	Older Alluvium	Opposite Sipra Path Police station.
JAIPUR	Sanganer	Mathurawala	PZ	GWD	75.8586	26.7328	0	108	Older Alluvium	Lhs On Road Leading From Bilwa To Saligrampura

JAIPUR	Jhotwara	MES JAIPUR	PZ	CGWB	75.7792	26.9333	1	67.8	Younger Alluvium	Opposite Assistant Garisson Engineer in Army Cantonment.
JAIPUR	Sanganer	MOHANA	PZ	CGWB	75.7161	26.7772	1	63.01	Older Alluvium	About 200m north of village, near Gusai Maharaj Samadhi on the fringe of abandoned tank.
JAIPUR	Jhotwara	N.PUROHITAN	PZ	CGWB	75.75	27.05	1	81	Younger Alluvium	Approach from Rajas on Chomu road,within premises of Sahkari Samiti,LHS of road.

Annexure-II

List of Pz monitored by GWD:

Well_Type	District	Block	Village	Owner_Name	Latitude	Longitude	Hyd_Formation	Zone	Total_Depth_bgl
PZ	Jaipur	Jhotwara	Achanchukiya	MJSA-III	26.8577	75.5317	Quartzite Schist	Q/Sch	120
PZ	Jaipur	Jhotwara	Army Cantt	CGWB	26.7808	75.7644	Yr. Alluvium	A	67.8
PZ	Jaipur	Sanganer	Awaniya	MJSA-III	26.8263	75.5133	Quartzite Schist	Q/Sch	120
PZ	Jaipur	Sanganer	Bagru	GWD	26.8132	75.5435	Older Alluvium	Ao	113.5
PZ	Jaipur	Sanganer	Bagru Rawan	GWD	26.7667	75.5000	Older Alluvium	Ao	62
PZ	Jaipur	Sanganer	Barkabalaji	GWD	26.7667	75.6333	Older Alluvium	Ao	110
PZ	Jaipur	Sanganer	Barkabalaji	GWD	26.8540	75.6355	Older Alluvium	Ao	120
PZ	Jaipur	Jhotwara	Begus	GWD	26.8770	75.5484	Yr. Alluvium	A	120
PZ	Jaipur	Sanganer	Bhamoriya	GWD	26.8208	75.6375	Mica Schist	Sch	90
PZ	Jaipur	Sanganer	Bhankrota	GWD	26.8632	75.6946	Older Alluvium	Ao	84.4
PZ	Jaipur	Sanganer	Bilwa	GWD	26.7530	75.8612	Mica Schist	Sch	71.5
PZ	Jaipur	Jhotwara	Bindayaka	GWD	26.9184	75.6486	Yr. Alluvium	A	112

PZ	Jaipur	Jhotwara	Brahmpuri	GWD	26.9412	75.8354	Quartzite	Q	90
PZ	Jaipur	Sanganer	Dahmi Kalan	CGWB	26.8333	75.5667	Older Alluvium	Ao	59.13
PZ	Jaipur	Sanganer	Dahmi Kallan	GWD	26.8333	75.5667	Mica Schist	Sch	90
PZ	Jaipur	Jhotwara	Dhankya	CGWB	26.9150	75.5807	Yr. Alluvium	A	80.32
PZ	Jaipur	Sanganer	Durgapura	GWD	26.8425	75.7912	Older Alluvium	Ao	67
PZ	Jaipur	Jhotwara	Govt. Hostel	GWD	26.9159	75.8009	Yr. Alluvium	A	108.5
PZ	Jaipur	Sanganer	Gwd Campus	GWD	26.8737	75.8197	Older Alluvium	Ao	112
PZ	Jaipur	Jhotwara	Hathoj	MJSA-I	26.9614	75.6848	Yr. Alluvium	A	90
PZ	Jaipur	Sanganer	Heerapura	GWD	26.8879	75.7178	Older Alluvium	Ao	62
PZ	Jaipur	Sanganer	Heerapura(Dhawas)	GWD	26.8881	75.7171	Quartzite Schist	Q/Sch	106
PZ	Jaipur	Sanganer	Jagannathpura	MJSA-II			0	0	120

PZ	Jaipur	Jhotwara	Jhotwara	GWD	26.9488	75.7365	Yr. Alluvium	A	84
PZ	Jaipur	Jhotwara	Kalwar	CGWB	26.9839	75.5957	Yr. Alluvium	A	60
PZ	Jaipur	Jhotwara	Kanakpura,	GWD	26.9348	75.7187	Yr. Alluvium	A	78
PZ	Jaipur	Jhotwara	Keshala	GWD	26.9018	75.5535	Yr. Alluvium	A	82
PZ	Jaipur	Sanganer	Kheri Gokulpura	GWD	26.7422	75.7967	Older Alluvium	Ao	120
PZ	Jaipur	Jhotwara	Lalchandpura	GWD	26.9203	75.6744	Yr. Alluvium	A	102
PZ	Jaipur	Jhotwara	Lalpura	MJSA-II	26.9794	75.5291	Quartzite Schist	Q/Sch	120
PZ	Jaipur	Sanganer	Mahal	GWD	26.8333	75.8667	Mica Schist	Sch	105
PZ	Jaipur	Sanganer	Mansarovar	GWD	26.8544	75.7641	Older Alluvium	Ao	63
PZ	Jaipur	Sanganer	Mathurawala	GWD	26.7591	75.8780	Older Alluvium	Ao	108
PZ	Jaipur	Sanganer	Muhana	CGWB	26.7994	75.7292	Older Alluvium	Ao	56
PZ	Jaipur	Sanganer	Muhana	GWD	26.8000	75.8014	Older Alluvium	Ao	45
PZ	Jaipur	Sanganer	Nevta	CGWB	26.8045	75.6759	Older Alluvium	Ao	63
PZ	Jaipur	Jhotwara	Niwaroo	GWD	26.9724	75.7130	Yr. Alluvium	A	63
PZ	Jaipur	Sanganer	O.T.S.	CGWB	26.8933	75.8097	Older Alluvium	Ao	67
PZ	Jaipur	Jhotwara	Pachar	GWD	26.9769	75.5476	Yr. Alluvium	A	102
PZ	Jaipur	Jhotwara	Panipech	GWD	26.9437	75.7945	Yr. Alluvium	A	125
PZ	Jaipur	Sanga	Pawanliya	MJSA	26.74	75.68	Mica Schist	Sch	100

		ner		-I	24	47			
PZ	Jaipur	Jhotwara	Raj Bhawan	GWD	26.9082	75.7839	Yr. Alluvium	A	100
PZ	Jaipur	Jhotwara	Ravindra Manch	GWD	26.9140	75.8226	Yr. Alluvium	A	92.25
PZ	Jaipur	Sanganer	Sanganer	GWD	26.8128	75.8087	Older Alluvium	Ao	120
PZ	Jaipur	Jhotwara	Sansoti	GWD	27.0005	75.6322	Yr. Alluvium	A	50
PZ	Jaipur	Sanganer	Sirani	GWD	26.7666	75.6273	Mica Schist	Sch	83
PZ	Jaipur	Jhotwara	Sirsi	GWD	26.9018	75.6743	Yr. Alluvium	A	90
PZ	Jaipur	Sanganer	Sukhpuriya	CGWB	26.7830	75.8231	Older Alluvium	Ao	59
PZ	Jaipur	Sanganer	Suryanagar	CGWB	26.8743	75.7781	Older Alluvium	Ao	52
PZ	Jaipur	Sanganer	Unti	GWD	26.7847	75.5000	Mica Schist	Sch	82
PZ	Jaipur	Jhotwara	Vidhyadhar Nagar	GWD	26.9617	75.7726	Yr. Alluvium	A	130
PZ	Jaipur	Sanganer	Watika	GWD	26.7120	75.8029	Older Alluvium	Ao	39.25

Annexure-III

List of Exploratory wells (NAQUIM Outsourcing-Package-3) :

District	Block	Location	Type of well	Well release date	Start Date	End Date
Jaipur	Sanganer	Muhana	EW	12/Jan/18	18-Jan-18	19-Jan-18
Jaipur	Jhotwara	Niwaroo	EW	2/Feb/18	1-Feb-18	2-Feb-18
Jaipur	Sanganer	Jaisinghpura	EW	12/Jan/18	22-Feb-18	25-Feb-18

Inception Report National Aquifer Mapping & Management Plan(NAQUIM 2.0) Jaipur Urban, Rajasthan (685sq.km)

Refrences:

- NAQUIM Study: "Aquifer Mapping and Management Plans", CGWB, WR Jaipur.
- Dynamic Groundwater Resources Report, 2022, CGWB, WR, Jaipur