Ground Water Year Book

भू जल वार्षिक पुस्तिका

National Capital Territory, Delhi

राष्ट्रीय राजधानी क्षेत्र, दिल्ली

2023-2024

GOVERNMENT OF INDIA
CENTRAL GROUND WATER BOARD
STATE UNIT OFFICE, DELHI

भारत सरकार
केंद्रीय भूमि जल बोर्ड
राज्य एकक कार्यालय,दिल्ली

DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
MINISTRY OF JAL SHAKTI

जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
जल शक्ति मंत्रालय

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केन्द्रीय भूमि जल बोर्ड,
राज्य एकक कार्यालय,
जल शक्ति मंत्रालय,
जल संसाधन, नदी विकास
एवं जल संरक्षण विभाग,
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CENTRAL GROUND WATER BOARD,
STATEUNIT OFFICE-DELHI,
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MINISTRY OF JAL SHAKTI
GOVERNMENT OF INDIA, NEW DELHI

Foreword

Ground Water Year Book is based on the information generated through field studies. The data has been analyzed by officers of Central Ground Water Board, State Unit Office, Delhi and presented in the report. The maps have been generated using ARC GIS, Surfer software and Map info.

Depiction of ground water condition in Delhi provides information on availability of ground water in terms of quantity and quality, development prospects and management options. I am happy to note that the scientific information in this report is presented in a simplified form. I sincerely hope this report will be of immense help not only to planners, administrators, researchers and policy makers in formulating development and management strategy but also to the common man in need of such information to make himself aware of the ground situation in NCT Delhi.

The untiring efforts made by Ms. Prachi Gupta, Scientist D, Ms. Kriti Mishra, Scientist C, Sh. V. Praveen Kumar, AHG, Sh. S. Ashok Kumar, STA-HG & Ms. Chandini Chandran, Young Professional for bringing out this report are highly appreciated.

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EXECUTIVE SUMMARY

GROUND WATER YEAR BOOK 2023-24: NCT DELHI

National Capital Territory (NCT) of Delhi occupies an area of 1483 sq. km. and lies between 28° 24' 15'' to 28° 53' 00'' N latitudes and 76° 50' 24" to 77° 20' 30" E longitudes. The population of NCT Delhi, as per the census 2011 is 167.87 lakhs with a density of 11320 persons / Sq.km area.

The normal rainfall of NCT Delhi is 611.8 mm. The rainfall increases from west to east. About 80% of the annual rainfall is received during the monsoon months July, August and September. The rest of the annual rainfall is received in the form of winter rain. Long- term rainfall data 1984 to 2023 shows that the rainfall in Delhi is highly variable and which in turn affects the natural recharge to ground water from year to year. The probability of rainfall exceeding normal rainfall of 611.8 mm is up to 62%.

The ground water availability in NCT Delhi is controlled by the hydrogeological characteristics of its varied geological formations namely Delhi Quartzite, Older & Younger Alluvium. Central Ground Water Board (CGWB) is monitoring groundwater levels and quality through its monitoring stations spread over both Alluvial as well as quartzite area of NCT of Delhi. Total 132 hydrograph monitoring stations data have been analyzed for this report, out of which 26 are dug wells and 106 are Piezometers.

District wise distribution of hydrograph network stations is highly uneven and varies from one monitoring station per 1.4 Sq.km in New Delhi district to one monitoring station per 30 sq. km in North East district. Considering this unevenness in distribution of monitoring stations, Central Ground Water Board is striving to increase the number of stations for better monitoring of the ground water regime in the diverse Hydrogeological terrain.

An analysis for numbers of monitoring wells in the different categories of the water levels for all four monitoring periods of year 2023-24 reveals that water level depth up to 5 m bgl varies considerably over two monitoring periods (May & other months) which shows that dynamic changes in ground water levels are conspicuously deciphered in shallow water zones. For depth range of 5 to 10 m bgl and 10 to 20 m bgl and more at few locations ground water levels in August, November & January compared to May period is not prominent. This may be interpreted as stressed water level conditions suppressing dynamic fluctuation in water levels. Whereas number of monitoring stations showing water level below 40 m bgl remain almost same in all four-monitoring periods indicate stressed water conditions in deep aquifers of NCT, Delhi.

The depth to water level recorded in NCT Delhi during 2023-24, in general varies from less than 2 m bgl in areas of Yamuna Flood plain and parts of Northwest & West district to more than 65 m bgl, mainly in areas underlain by Delhi Quartzite in Central, New Delhi and South districts. The water level during **May-2023** ranges from 1.08 to 66.84 m bgl and around 15 % of the area have shallow water level up to 5 m bgl while deep water levels of 20 m bgl to 66 m bgl is observed in around 17 % of area. In rest of the 68 %area have water level ranging between 5 m bgl to 20 m bgl. In **August-2023,** water level ranges from 0.53 to 67.2 m bgl and around 22 % of the areas have shallow water level up to 5 m bgl, and Deep water levels of 20 to 67 m bgl observed in around 18 % of the area. In rest of the 60 %, areas have water level in range of 5 to 20 m bgl. In **November-2023,** water level ranges from 0.84 to 67.41 m bgl and around 18 % of the area have shallow water level, and Deep water levels of 20 to 67 m bgl observed in around 19 % of the area. In rest of the 63 % of areas have water level in range of

5 to 20 m bgl. In **January-2024** water level range from 1 to 68.17 m bgl and around 15 % of the area, have shallow water level up to 5 m bgl, and around 18 % of area have deep water levels of 20 to 68 m. In rest of, 67 % areas have water level in range of 5 to 20 m bgl.

Analysis of seasonal water level fluctuation comparing **May 2023** period show rise in range of >0 to 2m in 61 % monitoring stations during **August 2023**, 62 % in **November 2023** and 54 % in **January 2024**. Few monitoring stations shows a rise more than 2 m like 17 % in August, 10 % in November and 5 % in January. Whereas nearly 21 % to 39 % monitoring stations show decline in range of 0 to 2 m, 1 % in range of 2 to 4m, and 1% to 2 % in a range of > 4, which reflect, overstress conditions.

The fluctuation of water level between **May-2022 and May-2023** of NCT Delhi shows rise up to 4 m in 47 % of wells and 1 % of wells show rise more than 4 m while other 44 % of monitoring wells show fall in range of 0 to 2 m, 2 to 4 m is 5%, rest of 3 % monitoring stations shows fall up to 4 m. Similarly, comparing **August-2022** water level with **August-2023** reveals that rise in the range of 0 to 2m in nearly 55 % of the wells, while 28 % wells shows fall in range of 0 to 2 m. Wells showing more than 2 m rise are about 15 % and fall are about 2 %. Comparing water level data of **November 2022** with **November 2023**, it is revealed that 44 % wells shows rise in range of 0 to 2 m whereas 4 % of wells show rise more than 2 m. and 39 % wells shows fall, in range of 0 to 2 m and the rest shows a fall more than 2 m. Comparing water level data of **January 2023** with **January 2024**, it is revealed that 38 % wells shows rise, mostly in range of 0 to 2 m whereas rise more than 2 m is about 6 %; whereas 50 % wells shows fall in range of 0 to 2m and rest shows more than 2 m.

Long-term behavior of water levels was studied by comparing water level data of May-2023 with 10 year mean water level of May (2013 to 2022) reveals change in water level ranges from -13.66 m to 17.70 m. Nearly 30 % of monitoring wells show fall in water level whereas rest 70 % wells show in rise of water levels. Comparing water level data of August-2023 with 10 year mean water level of August (2013 to 2022) reveals change in water level range –6.76 m to 38.11 m. Nearly 74 % of monitoring wells show rise in water level whereas rest 26 % monitoring wells show fall in water level. Comparing water level data of November-2023 with 10 year mean water level of November (2013 to 2022) reveals change in water level range from -17.79 m to 16.97 m. Nearly 78 % of monitoring wells shows rise in water level whereas rest 22 % monitoring wells show fall in water level. Comparing water level data of January-2024 with 10-year mean water level of January (2014 to 2023) reveals change in water level range from -18.27 m to 16.45 m. Nearly 65 % of monitoring wells show rise whereas rest 35 % monitoring wells show fall.

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1. INTRODUCTION

The State Unit Office of Central Ground Water Board Delhi has jurisdiction over the National Capital Territory (NCT) of Delhi, covering an area of 1483 Sq.km and lies between 28°24'15'' & 28°53'00'' *North Latitudes* and 76°50'24" & 77°20'30" *East Longitudes*, covered under Survey of India Toposheet Nos. 53D and 53H. The NCT of Delhi is surrounded on three sides by two States, i.e., on North, West and South by Haryana and in the East across the river Yamuna by Uttar Pradesh.

1.1 Administrative Setup of NCT Delhi

NCT of Delhi is divided in 11 Revenue District and one non-revenue unit along river Yamuna, named as *Nazul Land*. Each district is headed by District Magistrate and assisted by 1 Additional District Magistrate &3 Sub Divisional Magistrates. The District Administration in Delhi is the *de-facto* enforcement department for all kinds of Government Policies and exercises supervisory powers over numerous other functionaries of the Government of NCT, Delhi. As per District Census Hand Book, 11 districts of NCT of Delhi are further subdivided into 3 Tehsils for each district and there are total 33 Tehsils, with 112 villages, 110 Census Town and 3 Statutory Towns. Administrative map of NCT of Delhi is shown in Fig. 1 and list of districts, tehsils is presented in table 1 and detailed list of urban / rural areas given in annexure I.

Fig. 1

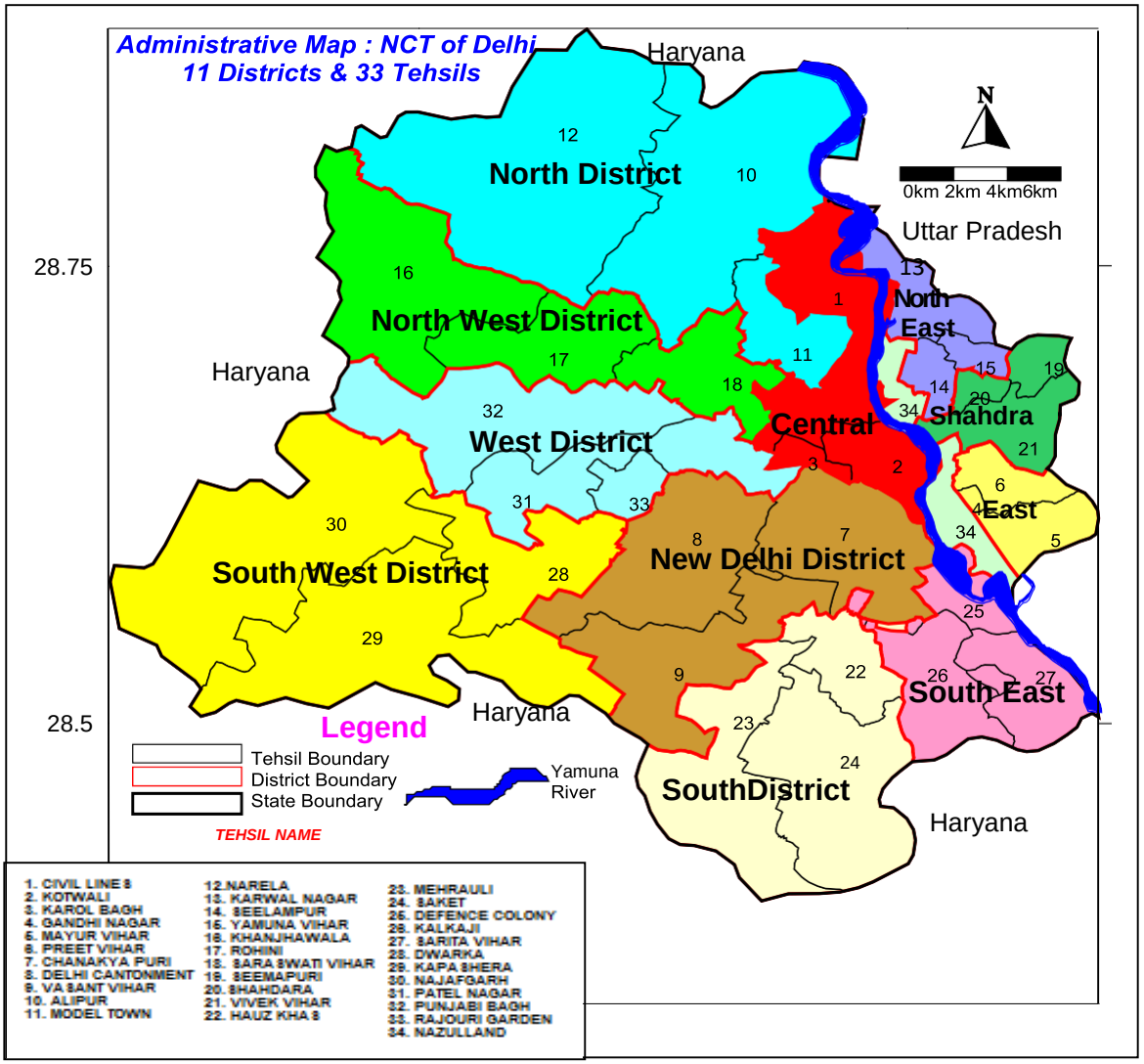


Table 1: Details of Administrative Units - NCT of Delhi

S. No.	District Name	Tehsil Name
1	CENTRAL	CIVIL LINES
		KOTWALI
		KAROL BAGH
2	EAST	GANDHI NAGAR
		MAYUR VIHAR
		PREET VIHAR
3	NEW DELHI	CHANAKYA PURI
		DELHI CANTONMENT
		VASANT VIHAR
4	NORTH	ALIPUR
		MODEL TOWN
		NARELA
5	NORTH EAST	KARAWAL NAGAR
		SEELAMPUR
		YAMUNA VIHAR
6	NORTH WEST	KHANJHAWALA
		ROHINI
		SARASWATI VIHAR
7	SHAHDARA	SEEMAPURI
		SHAHDARA
		VIVEK VIHAR
8	SOUTH	HAUZ KHAS
		MEHRAULI
		SAKET
9	SOUTH EAST	DEFENCE COLONY
		KALKA JI
		SARITA VIHAR
10	SOUTH WEST	DWARKA
		KAPASHERA
		NAJAFGARH
11	WEST	PATEL NAGAR
		PUNJAB BAGH
		RAJOURI GARDEN
Non-Revenue Unit Area		NAZUL LAND

1.2 Population & Land Use

As per Census of India Report 2011 total population of NCT of Delhi is 167, 87,941 persons. Out of total 1483 sq km areas, only 25 % constitutes rural areas spread in 112 villages [Annexures I(A)&I(B)], which is sparsely populated having population density of 1135 persons / sqkm, whereas rest 75 % is urban areas spread in 110 Census Towns and 3 Statutory Towns and it is densely populated with population density of 14,698 persons / Sqkm. Details of villages and towns and its area & populations and land use pattern is given in table 2a & 2b respectively.

Population of Delhi has increased at a rate of 2.1% per annum during the decade 2001- 2011. Considering the same growth rate for the present decade, it is estimated that the population of Delhi in 2024 will be about 195 lakhs and it would be about 225 lakhs in 2026, 245 lakhs by 2031. In order to evaluate the changes in ground water regime due to ever-growing demand for ground water and the increasing numbers of abstraction

Structures in the city, CGWB has been continuously monitoring the water level variation from its own monitoring network stations spread over the entire area of NCT Delhi.

Table 2a: Area, Population & Details of Towns and Villages: NCT of Delhi

Area & Population

Total Area: 1483 sqkm **Total Population 167,87,941 persons**

- Urban Area: 1136.5 sqkm (75 %) Urban Population: 163,68,899 (98%)
- Rural Area: 369.35 sqkm (25%) Rural Population: 4,19,042 (2%)

Details of Towns - Urban Area

- Statutory Towns :3
  - New Delhi Municipal Council: Area 42.74 sqkm; Population:2,57,803
  - Delhi Cantonment Board : Area 42.97 sqkm; Population: 1,10,351
  - Delhi Municipal Corporation: Trifurcatedinto
    - North Delhi Municipal Corporation (NDMC)
    - South Delhi Municipal Corporation(SDMC)
    - East Delhi Municipal Corporation (EDMC)
- Census Towns: 110 - (List – Details Annexure-IA)

DMC & Census Town Area: 1028 sqkm: Population 160,00,745

Details of Villages - Rural Area

- Villages: 112 (List – Details Annexure IB)Village Area: 363.35 sqkm: Population 4,19,042

Source: Delhi Statistical Handbook-2023: www.delhigovt.nic.in

Land utilization data for year 2023-24 reveals that out of 1474.8 sqkm areas accounted for Land Records in NCT of Delhi, more than 57 % area is not available for cultivation whereas only 192.25 sqkm is available for cultivation and nearly 435 Sq. km is gross cropped / agriculture areas. Nearly 6% of total area is under forest, covering mostly notified ridge areas and other forest pockets under DDA & government forestland. Break up of land utilization is presented in Table 2b and depicted graphically in Fig. 2a, Fig 2b.

Table: 2b Utilization of Land in Delhi (2022-23) Area in Hectares

Area according to Land use Records (Exclude Forest)		147488
Area not Available for Cultivation		92700
(a) Land Put to Non-Agriculture Use -	76218	
(b) Barren and Uncultivated Land	16482	
Other Uncultivated Land		11124
(a) Permanent Pasture & Other Grazing Land	61	
(b) Land Use Under Miscellaneous Uses	1170	
(c) Cultivable Waste Land	9893	
Fallow Land		19225
Net Area Sown		29000
Area Sown more than once		18850
Total Cropped Area		47850
Area Under Forest		9453
(a) Forest Under DDA	1281	
(b) Notified Ridge Forest	7784	
(c) Other Forest Area	388	

Source: Joint Director of Agriculture, Govt of NCT, Delhi

Table: 3 Sources of Irrigation and Irrigated Area 2022-23

Source		Area Irrigated (in Hectare)	
Canals			2235
Tanks			
Wells	TWs	21477	22465
	Others	988	
Net Area Irrigated			24700
Area Irrigated More Than Once			11284
Gross Area Irrigated			35984

Source: Joint Director of Agriculture, Govt of NCT of Delhi

Main source for irrigation in NCT of Delhi is groundwater whereas surface water is also available from Trans Yamuna Canal Network. Details about sources of irrigation and areas under irrigation is presented in the Table 3.

Fig. 2a

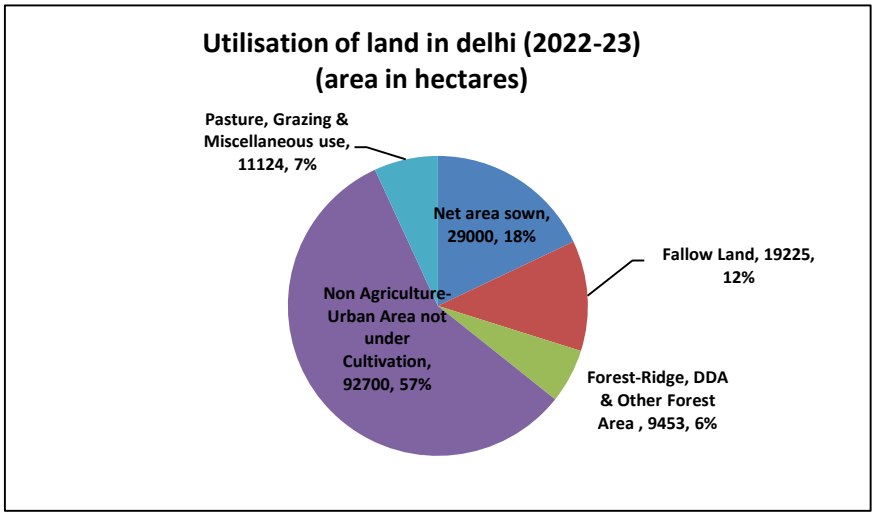
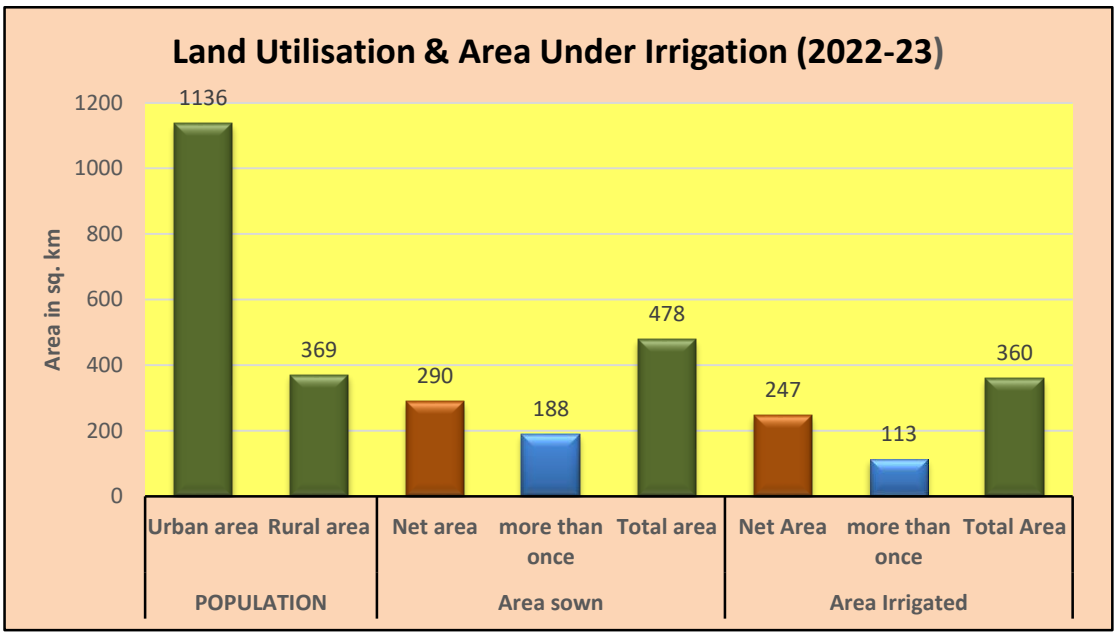


Fig. 2b



1.3 Climate and Rainfall

1.3.1 Climate

The climate of NCT Delhi is mainly influenced by its inland position and the prevalence of air of the continental type during the major part of the year. Extreme dryness with the intensely hot summer and cold winter are the characteristics of the climate. Only during the three-monsoon months July, August, and September does air of oceanic origin penetrate to this state and causes increased humidity, cloudiness and precipitation. The year can broadly be divided into three seasons (Table 4). Data on long-term average climatologic parameters covering monthly maximum / minimum temperature, relative humidity, evaporation and rainfall for NCT of Delhi is given in Table 5 and presented graphically in Fig 3.

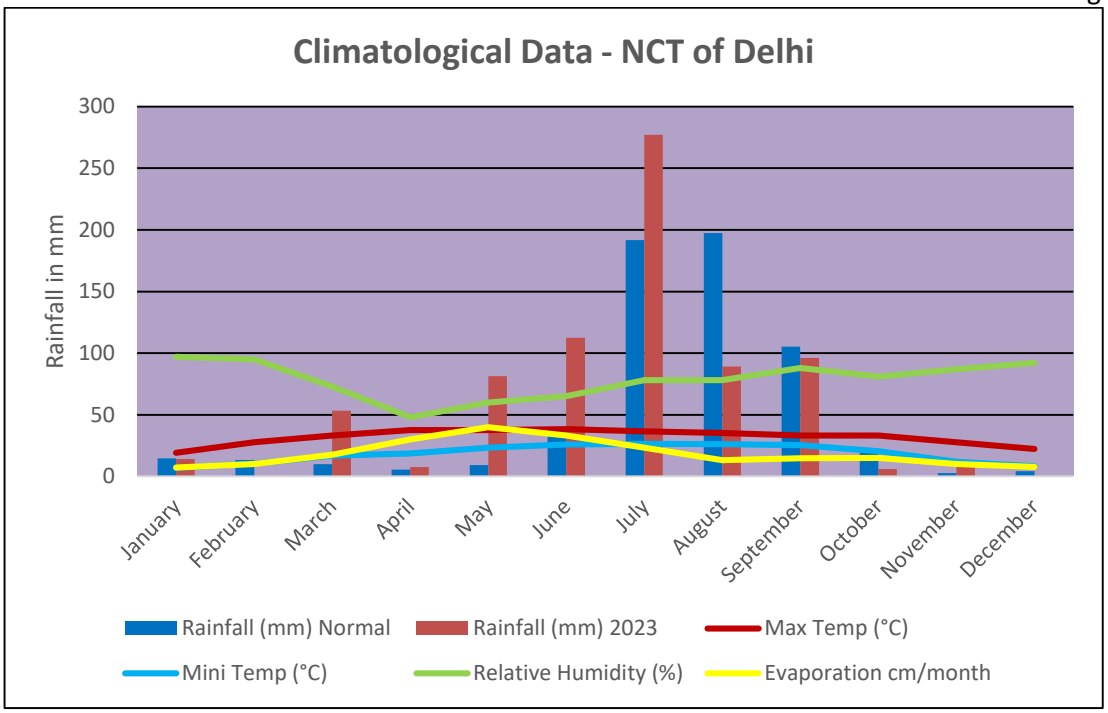
Table 4: Climate Seasons in NCT of Delhi

Season	Begin	End
Cold/Winter	End of November	Middle of March
Summer	Middle/End of March	End of June
Rainy season	Early July	September

Table: 5 Climatological Parameters – NCT of Delhi

Month	Max Temp (°C)	Mini Temp (°C)	Relative Humidity (%)	Rainfall (mm) Normal	Rainfall (mm) 2023	Rainy Days	Eto (mm/d)
January	19.2	7	97	14.5	14.1	5	7.1
February	27.7	10.3	95	13.2	0	1	10.1
March	33.1	16.8	73	9.9	53.18	0	17.7
April	37.5	18.7	48	5.5	7.64	0	30.0
May	37.5	23.3	60	9.2	81.33	3	40.0
June	38.3	25.9	65	38.8	112.62	3	33.3
July	36.5	26.4	78	191.6	277.11	11	23.3
August	35.2	26.3	78	197.4	89.2	5	13.3
September	33.2	25.5	88	105.3	96.26	6	14.7
October	33.1	20.5	81	19.3	6.13	2	14.9
November	27.8	11.9	87	2.8	8.94	0	10.2
December	22.4	8.2	92	4.3	0.07	0	7.8
Total	**-**	**-**	**-**	**611.8**	**746.58**	**36**	**222.4**
Average	**31.79**	**18.4**	**78.5**				

Fig. 3



1.3.2. Rainfall

The normal rainfall in NCT Delhi is 611.8 mm. The rainfall in NCT Delhi increases from the southwest to the northwest (Fig. 4). About 81% of the annual rainfall is received during the monsoon months June, July, August and September. The rest of the annual rainfall is received as winter rains and as thunderstorm rain in the pre and post monsoon months. The variation of rainfall from year to year is large.

1.3.3. Rainfall Analysis

Rainfall analysis of 34 years annual rainfall of data and probability analysis data is plotted in figure 5 & 6 and its finding, about probability of occurrence of quantum of rainfall with various probability is presented in Table 6. (Data analyzed for probability graph Annexure II).

Fig. 4

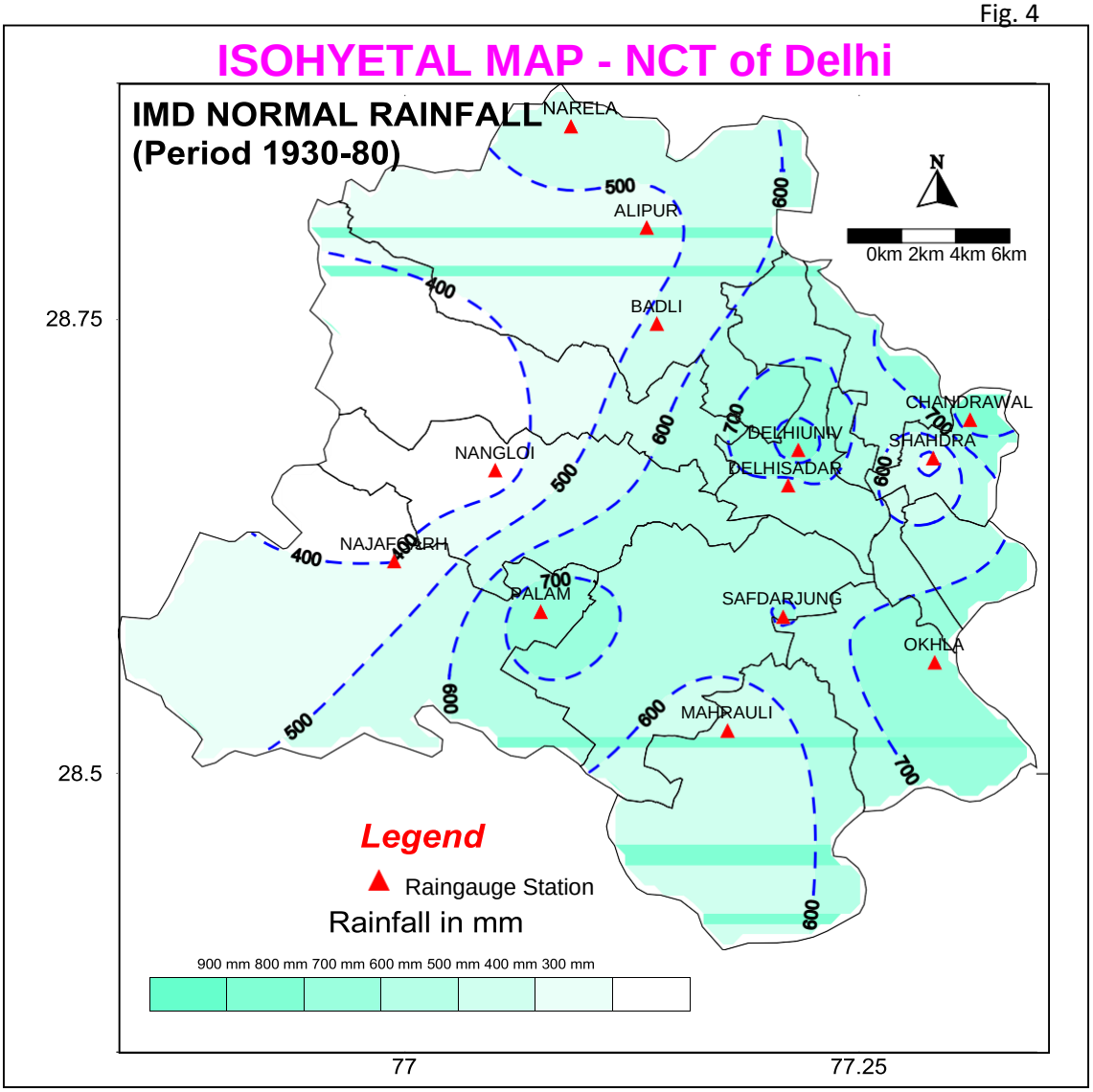

ISOHYETAL MAP - NCT of Delhi
IMD NORMAL RAINFALL
(Period 1930-80)
NARELA
ALIPUR
BADLI
NANGLOI
NAJAFGARH
PALAM
DELHIUNIV
DELHISADAR
SHAHDRA
CHANDRAWAL
SAFDARJUNG
OKHLA
MAHRAULI
500
600
400
700
N
0km 2km 4km 6km
28.75
28.5
77
77.25
Legend
Raingauge Station
Rainfall in mm
900 mm 800 mm 700 mm 600 mm 500 mm 400 mm 300 mm

Fig. 5

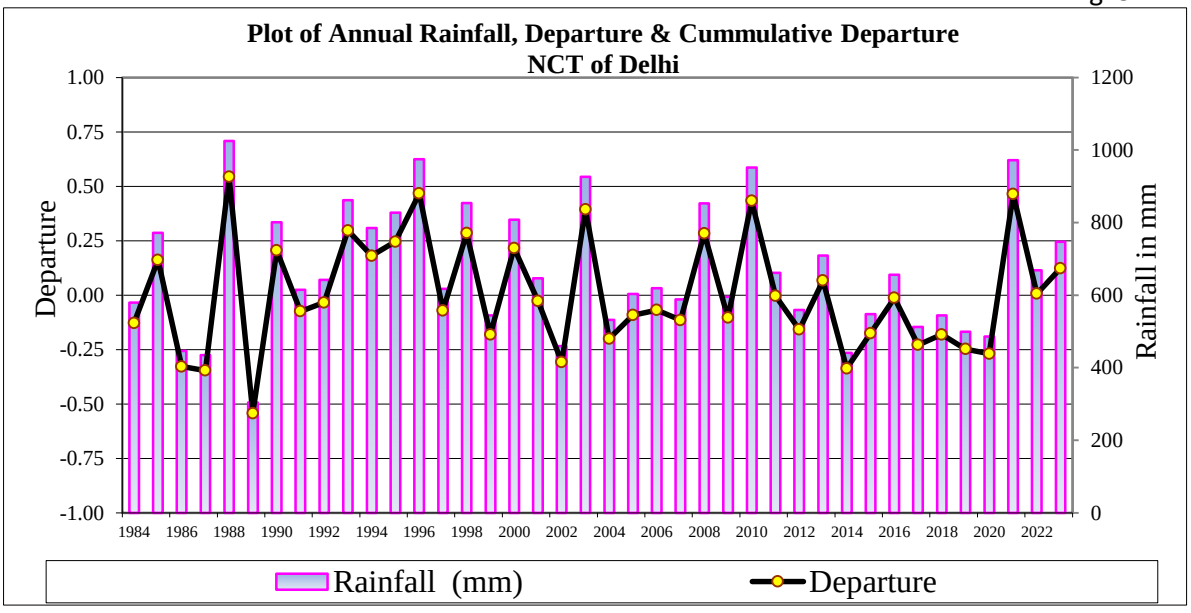

Plot of Annual Rainfall, Departure & Cummulative Departure
NCT of Delhi
Departure
Rainfall in mm
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
-1.00
1200
1000
800
600
400
200
0
1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022
Rainfall (mm)
Departure

Fig.6

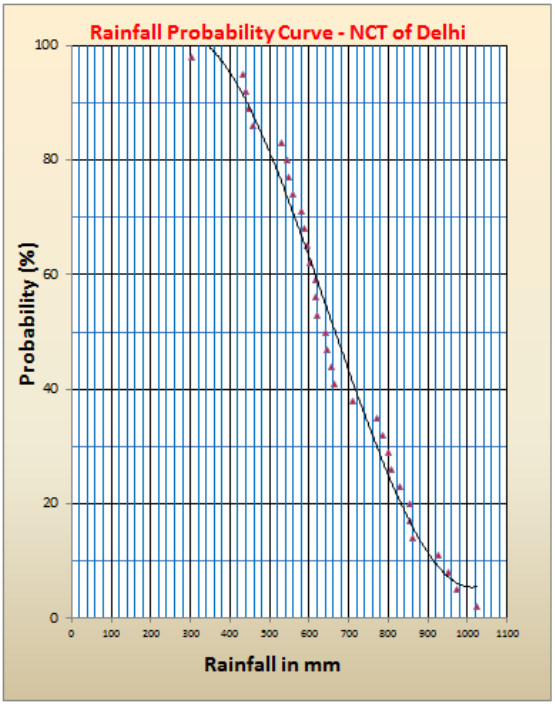


Table 6: Rainfall Probability	
Probability %	Annual Rainfall in mm
10%	922
20%	840
30%	778
40%	718
50%	664
60%	618
70%	562
80%	520
90%	476

A perusal of rainfall data from 1984 to 2022 shows that NCT Delhi received deficient rainfall during last 22 years corresponding to mild to severe drought conditions (Annexure-II). Severe drought with departure of 50 % was experienced in the year 1989. Normal drought, departure 25 to 50 % was experienced during year 1986, 1987, 2002 and recently during 2014. Whereas, Mild drought, departure up to 25 %, was experienced during the year 1984, 1991,1992, 1997, 1999, 2001, 2004 to 2007, 2009, 2010, 2012 and 2015 to 2023.

The probability analysis shows that probability of rainfall exceeding normal rainfall of 611 mm is up to 48 % whereas there are 90% chance that rainfall would limit to 476 mm. Overall, the rainfall in Delhi is highly variable and which in turn affects the natural recharge to ground water from year to year. The effect of climate change is visible since 2019 onwards. The rainfall events are intense & more frequent during monsoon months with less no. of rainy days.

1.3.4. Other Climatic Parameters

- Temperature:

The cold season starts after second week of November when both day and night temperature drop rapidly with the advance of the season. January is the coldest month during which mean daily maximum and minimum temperature varies between 21.3°C to 7.3°C. In the winter months when western disturbances pass over North India, minimum temperatures may sometimes go down to the freezing point of water. From about the middle of March, temperature begins to rise rapidly. May and June are the hottest months. While day temperature is higher in May the nights are warmer in June. From April the hot wind known locally as *'loo'* blows and the weather is unpleasant. In May and June maximum temperature may sometimes reach 46 or 47°C. With the advance of the monsoon

into the area towards the end of June or the beginning of July day temperatures drop appreciably while the night temperatures remain high. In October the day temperatures are as in the monsoon months, but the nights are cooler.

- Humidity:

The air over Delhi is dry during the greater part of the year. Humidity is high in the monsoon months. April and May are the driest months with relative humidity of about 30% in the morning and less than 20% in the afternoons.

- Cloudiness:

During the monsoon especially in July and August skies are heavily clouded and often overcast. In the rest of the year skies are clear or lightly clouded. But in the months January, February and early March skies become cloudy by western disturbances.

- Winds:

Winds are generally light during the post monsoon and winter months. They strengthen during the summer and monsoon months. Except during the monsoon months, winds are predominantly from a westerly or northwesterly direction and tend to be more northerly in the afternoon. Easterly and southeasterly winds are more common in the monsoon months.

2. GROUND WATER REGIME MONITORING

Central Ground Water Board is monitoring the ground water regime through the length and breadth of the country since the year 1969 through a network of (National Hydrograph Station) NHS. As on January 2024 a total of 129 NHS which included 104 Piezometers and 25 Dug wells were monitored in NCT Delhi. Monitoring of ground water levels is an effort to obtain information on variation in ground water regime in time and space. Systematic and regular monitoring of groundwater levels brings out various information about the changes taking place in the groundwater regime due to change in climate, demography, usage and agriculture pattern and infrastructure development.

2.1. Monitoring Objective and Method

Main objective is to record the response of ground water regime to the natural and artificial conditions of stresses with reference to geology, climate, physiography, land-use pattern and other hydrologic characteristics. The database generated, in forms of reports and maps, are of immense help for regional groundwater flow modeling which serves as a groundwater management tool to provide the necessary advance information to the stakeholders to prepare contingency plans in case of unfavorable groundwater recharge situation. The data also has immense utility in deciding the legal issues arising out of conflicting interests of groundwater users and also form the basis for ground water development and management programme.

2.1.1. Status of Monitoring Stations

Central Ground Water Board, as part of its national programme, has established network of observation wells in the NCT of Delhi for monitoring ground water regime. Number of wells monitored during 2023-24 in NCT of Delhi varies from 129 in May 2023 to 132 in November 2023 details of which with district wise breakup and types of wells (dug wells / piezometers etc) is given in Table 7. The distribution of monitoring wells in NCT of Delhi is shown in Fig 7. (Annexure III(A).)

Table: 7 Number of NHN Stations Monitored by CGWB During 2023-24 – NCT Delhi

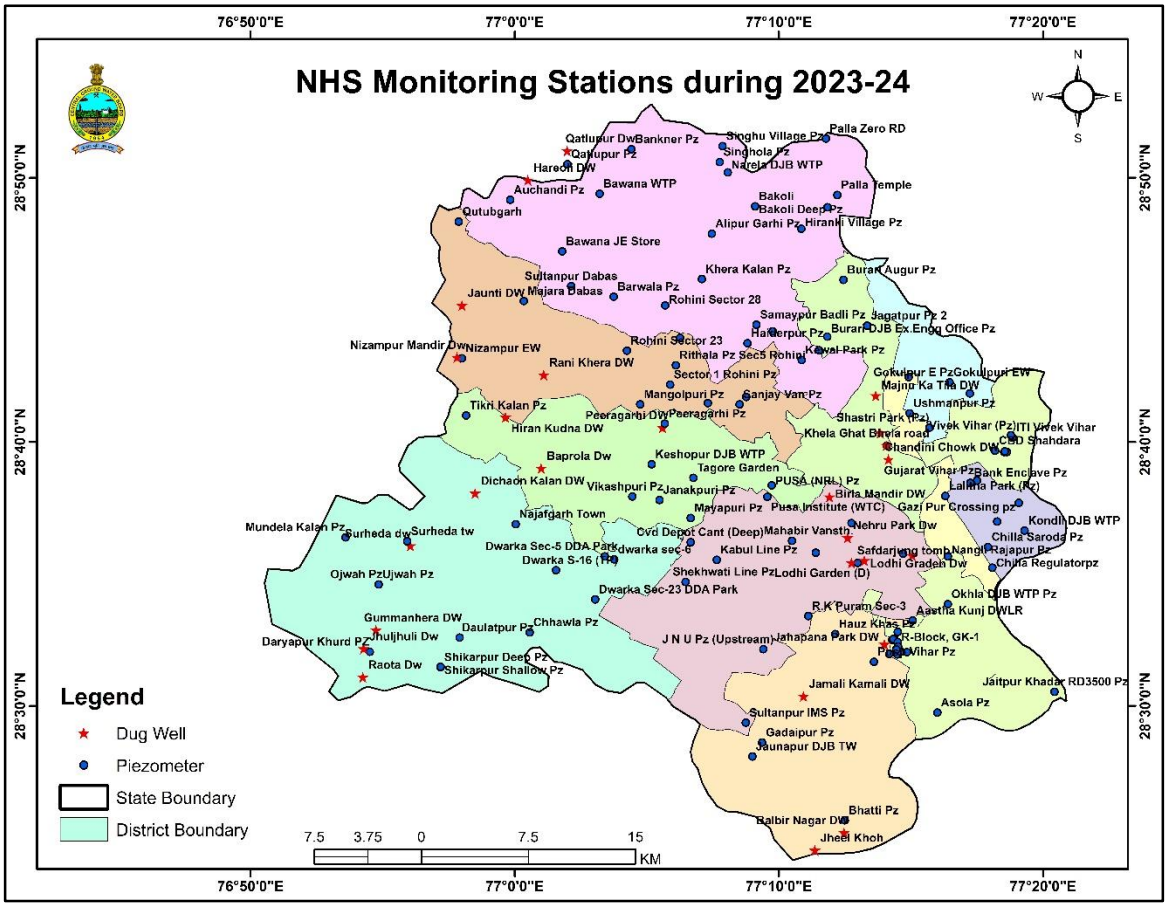
	May-23			Aug-23			Nov-23			Jan-24		
	Dw	Pz	**Total**	Dw	Pz	**Total**	Dw	Pz	**Total**	Dw	Pz	**Total**
Central	4	4	**8**	4	5	**9**	4	5	**9**	4	5	**9**
East	0	7	**7**	0	7	**7**	0	7	**7**	0	6	**6**
New Delhi	5	10	**15**	4	12	**16**	5	13	**18**	5	14	**19**
North	2	23	**25**	2	21	**23**	2	22	**24**	2	22	**24**
North East	0	3	**3**	0	3	**3**	0	3	**3**	0	2	**2**
North West	3	13	**16**	3	11	**14**	3	13	**16**	3	12	**15**
Shahdara	0	2	**2**	0	2	**2**	0	6	**6**	0	2	**2**
South	3	5	**8**	3	5	**8**	3	5	**8**	3	5	**8**
South East	1	14	**15**	1	10	**11**	1	11	**12**	0	14	**14**
South West	4	12	**16**	5	12	**17**	5	10	**15**	5	12	**17**
West	3	9	**12**	3	9	**12**	3	9	**12**	3	8	**11**
Nazul Land*	0	2	**2**	0	1	**1**	0	2	**2**	0	2	**2**
Total	25	104	**129**	25	98	**123**	26	106	**132**	25	104	**129**

DW: Dug well & Pz: Piezometer; * Non-Revenue Land Area – Yamuna Flood Plain Area

It is observed that at present district wise distribution of monitoring network stations is highly uneven. Some of these active monitoring stations have become defunct during same AAP largely due to corrosion of well assembly and at some places, destroyed / filled up due to other unavoidable urban development activities. During last two decade, at places, continuous decline in ground water level is observed. Such condition necessitates more attention and close monitoring at micro level. It is fact

that establishing of new Piezometers or identifying new working dug wells in metropolitan city of Delhi is very difficult due to non-availability of space, although Central Ground Water Board is striving to increase the number of monitoring stations in NCT Delhi to have close observation in the diverse hydrogeological domain. To ensure optimum network density of monitoring station for scientific analysis of the dynamics of ground water regime, in exceedingly developing areas of NCT Delhi is most inevitable. CGWB has taken up groundwater exploration programme to drill and construct new piezometers to replace existing defunct piezometers in NCT Delhi from the Annual Action Plan of year 2017-18 onwards. Map showing locations of existing monitoring stations of CGWB is presented in Fig.7.

Fig. 7



2.1.2. Distribution of Monitoring Stations

Central Ground Water Board has carried out extensive hydrogeological mapping and groundwater exploration in NCT of Delhi and its surrounding States. The information generated from these studies has helped to figure out the subsurface disposition and inter-relationship of the aquifers spatially and depth wise. This information has enabled to decide grouping of interrelated aquifers into one aquifer system for the purpose of monitoring.

In alluvial areas of NCT of Delhi, number of sand zones constituting individual local aquifers is grouped into major one main aquifer system and piezometers have been installed accordingly. Three distinct potential aquifer groups within the depth of 450 m below ground level, identified and grouped on basis of various hydrogeological mapping and ground water exploration, are as follows:

1. Aquifer Group I - Down to 65 m below ground level(Un-confined)
2. Aquifer Group II- Between 65 to 200 m below ground level (Confined/Semi-Confined)
3. Aquifer Group III- Between 200 to >300 m below ground Level(Confined)

Separate piezometers are installed, tapping the two aquifer groups, the first one in the phreatic zone deep enough to accommodate long term fluctuation (i.e. up to 65 m deep) and the other one tapping the middle parts of the aquifer groups II, lying between 65 to 200 m. The Aquifer group III is not being monitored at present.

Similarly, hard rock area of NCT Delhi is being monitored through piezometric nests, which are installed in a single borehole tapping the weathered and fractured aquifers combined. Generally, the depth of the well goes up to 80 m bgl, but in some cases, it goes up to 140 m bgl.

Besides piezometers, many numbers of dug wells, tapping phreatic aquifer zone are included in monitoring network. Over the period, numbers of dug wells are becoming defunct due to lack of their use and maintenance. Still, there are 26 dug wells integrated with monitoring network of NCT Delhi (Fig. 7).

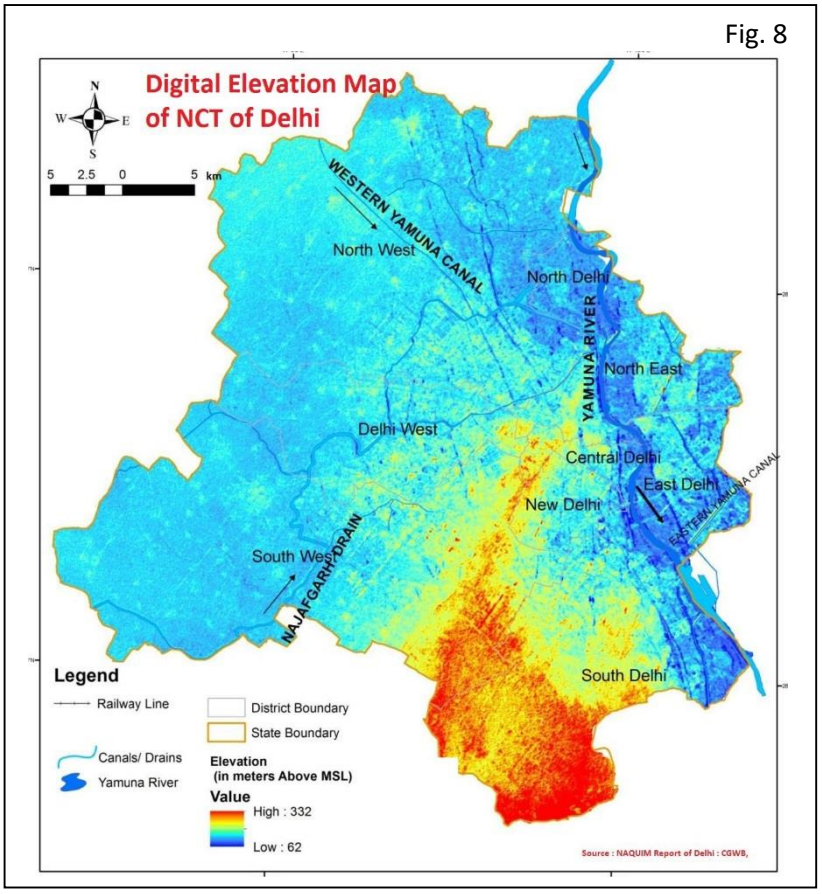
3. HYDROGEOLOGY

Occurrence and movement of groundwater in subsurface aquifer system depends upon topography, geology, climate, water yielding and water bearing properties of subsoils / rocks in the zones of aeration and saturation. The upper surface of the zone of saturation is the Water Table which is measured during water level monitoring. In case of wells penetrating confined aquifers, the water level represents the pressure or Piezometric Head at that point. For effective water level monitoring, it is essential to have a complete understanding of aquifer disposition and geometry in the area before establishing monitoring network.

3.1 Physiography & Drainage

NCT of Delhi represents a mature topography with vast, gently undulatory plains dominated by Yamuna River, low linear ridges and isolated hillocks. Physiography of Delhi is dominated by the Yamuna River, the Aravalli range, and the plains in between formed by alluvium deposits of recent age. The SSW- NNE trending Aravalli Ranges are designated as *Delhi Ridge*, occupy the South-Central part of Delhi and extend up to western bank of Yamuna River near Okhla in the south and Wazirabad in the north-east. Ecologically, the Aravalli Ridge acts as a barrier between the Thar Desert and the plains and slows down the movement of dust and wind from the desert. In NCT Delhi, the ridge area is covered with forests, acts as city's lungs and helps maintain its environment. This green belt, a natural forest, has a moderate influence on temperature, besides bestowing other known benefits to the people.

Fig. 8

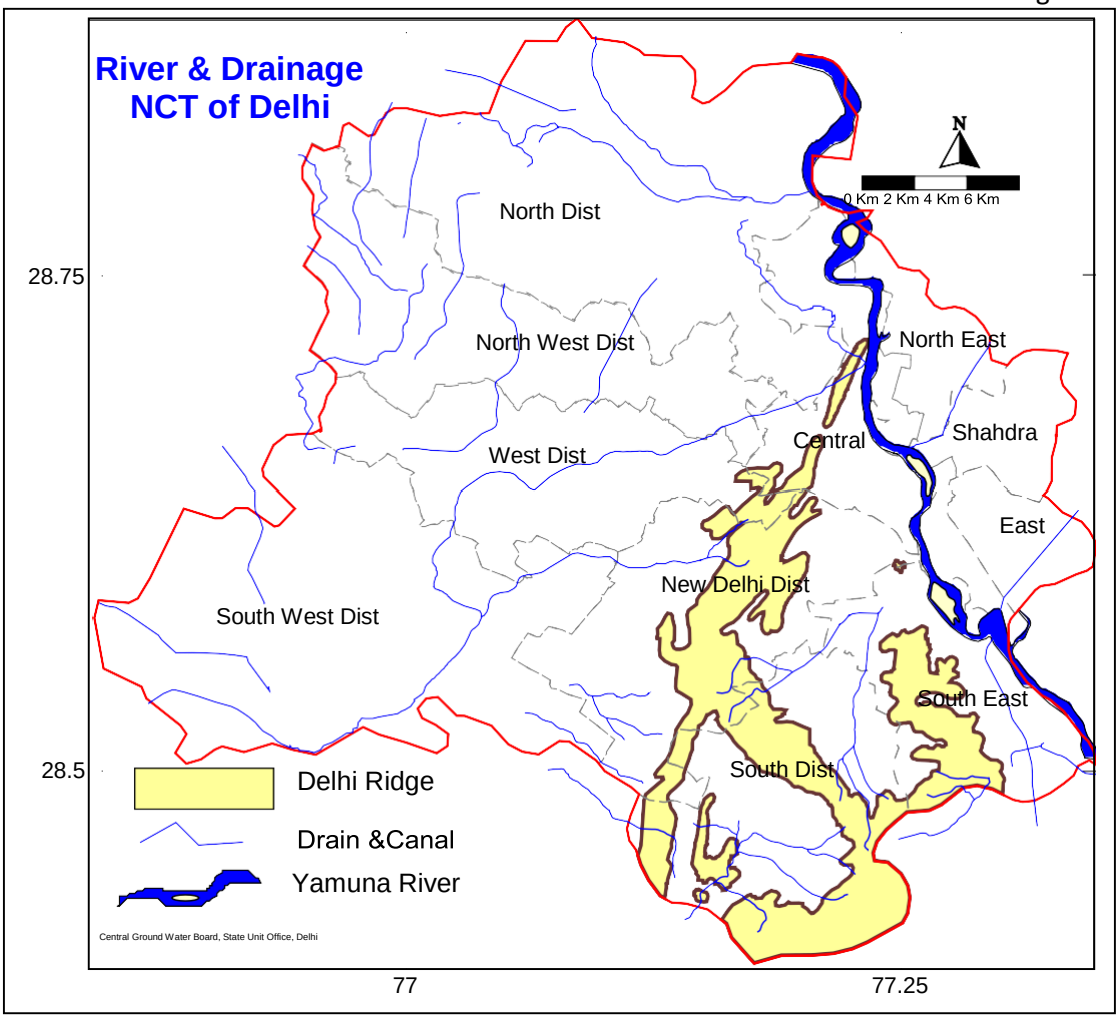


The area towards east of ridge has a gentle slope of 3.5 m/km towards Yamuna. The area towards west of ridge representing Older Alluvial Plain is mostly covered by sand dunes and has a westerly slope. Yamuna River flows across Delhi in a south-southeasterly direction with vast flood plain, marked by a bluff of 3 to 4 m on either bank. Digital Elevation Model Map of Delhi is presented in Fig. 8. Surface elevation varies from 332 m above mean sea level at the ridge to 62 m above mean sea level at river Yamuna. The low-lying Yamuna flood plains, with an elevation as low as 198 m amsl, provide fertile alluvial soil suitable for agriculture but are prone to recurrent floods.

The Yamuna river flowing in a southerly direction in the eastern part of the NCT of Delhi is the only perennial river in the area besides the number of micro watersheds originating from the quartzite ridge. The drainage on the East of the ridge enters river Yamuna, whereas on the West, it enters natural depressions located in Najafgarh Tehsil of South-West district. The NCT of Delhi can be

divided into seven sub basins, ultimately discharging into the Yamuna (Fig. 9), namely (I) The Najafgarh Drain is about 39 Km long, flows North-Easterly and joins Yamuna River at Wazirabad in North Delhi. (ii) Supplementary drain, (iii) Barapullah drain (iv) Wild life sanctuary area, (v) Drainage of Shahadra area, (vi) Bawana drain basin, (vii) Other drains directly out falling into river Yamuna on right bank. Swamp areas are common along the flood plains of Yamuna.

Fig. 9



3.2 Geomorphology

The ground water availability in NCT of Delhi indirectly relates with its distinct landform units, which in turn represent underlying intrinsic geological features. Map showing these landforms of NCT of Delhi are presented in Fig. 10. All these landforms of NCT, Delhi can be grouped into three broad geomorphic units: namely Rocky surface, Older Alluvial Plain and Flood Plain of Yamuna River.

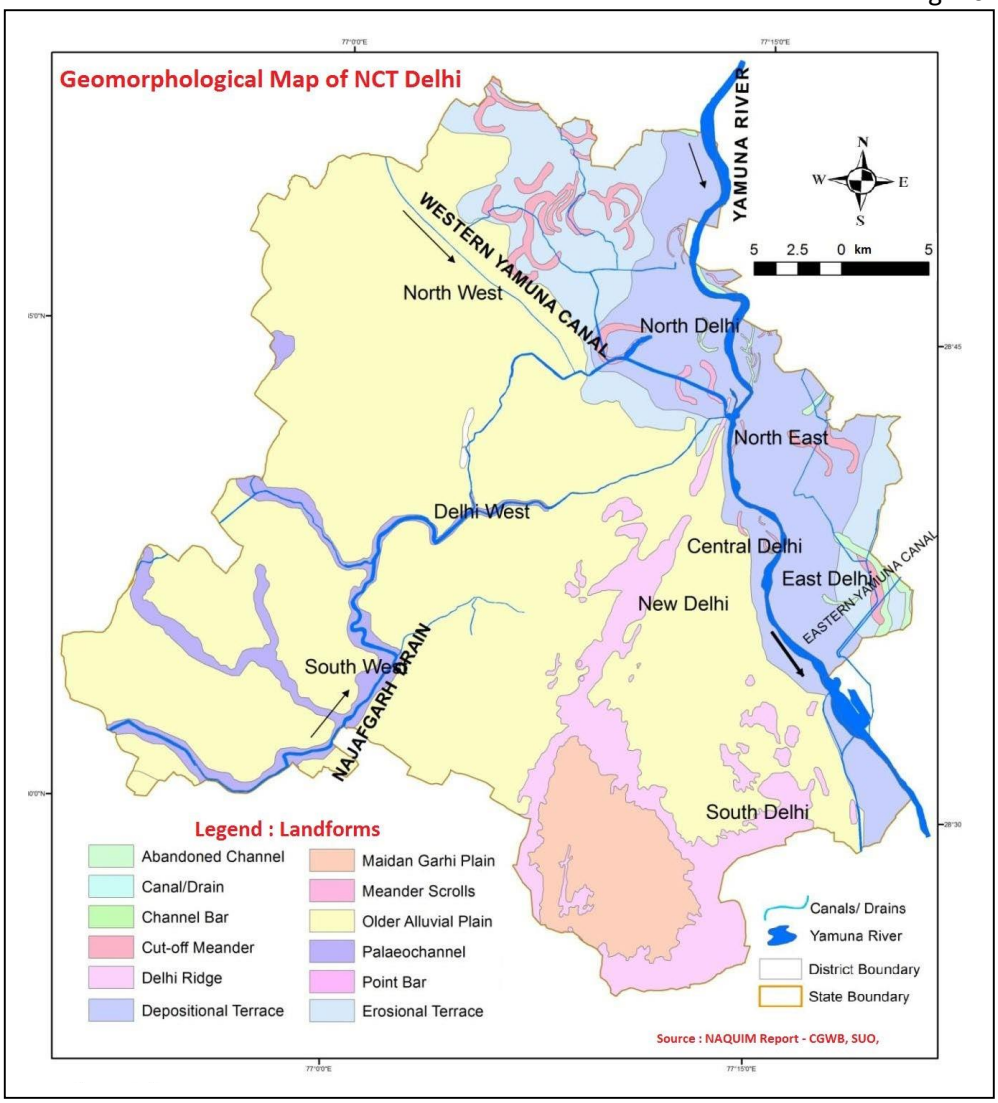
Rocky Surface: The rocky surface represents structurally controlled relict linear ridges and isolated hillocks comprising of rocks of Delhi Super group. This distinct landform comprising of isolated hills is most prominent in the South- and South-Central parts, extends from Mahipalpur to Wazirabad in the north. Towards south of Mahipalpur the ridge gets bifurcated, one arm extends towards Mandi and further south while the other arm takes a turn towards southeast and extends upto Tughlakabad-Greater Kailash-Nehru Place and Okhla. It attains a maximum elevation of 362 m amsl which gradually diminishes towards north where rocks are exposed on the western bank of Yamuna near Wazirabad.

Older Alluvial Plain: The gently undulating terrain on either side of the rocky surface is described as Older Alluvial Plain. This surface is separated from the Yamuna Flood Plain by a bluff. Depending upon

the morphological expressions / features, this unit is further divided into different subunits: namely, (i) Najafgarh Older Alluvial Plain, (ii) Delhi Older Alluvial Plain and (iii) Maidan Garhi Plain. Najafgarh Older Alluvial Plain occupying western and southwestern part of the region is partly covered by sand dunes and sandy sheets. The gently sloping surface including the covered pediment along the eastern flank of the ridge represents the Delhi Older Alluvial Plain. Maidan Garhi Plain is a relatively higher plain surface and forms part of Chhatarpur Basin. A narrow zone of badland has formed mostly along the western margins of structural ridges due to intense development of gullies and rills.

Flood Plain of river Yamuna: The low-lying flat surface representing the Flood Plain of river Yamuna occupying northern, northeastern and eastern parts of the NCT is an important geomorphic unit. North of Narela, the width of flood plain varies from 15 to 17 km. The wider Older Yamuna flood plain indicates lateral migration of river Yamuna over large areas. This belt has good potential for ground water development. It forms the erosional terrace. The Yamuna Active Flood Plain represents the wide belt bounded on both the sides by Eastern and Western bunds and is naturally prone to annual / periodic floods being in the flood way and flood fringe zone of river Yamuna. It forms depositional terrace and is characterized by abandoned channels, cut-off meanders, meander scrolls, point bars and channel bars. Presence of number of cut- off meanders in the Yamuna Flood Plain suggests oscillatory shifting of river. The lakes near Bhalsawa, Kondli and Khichdipur are remnants of large meanders.

Fig. 10



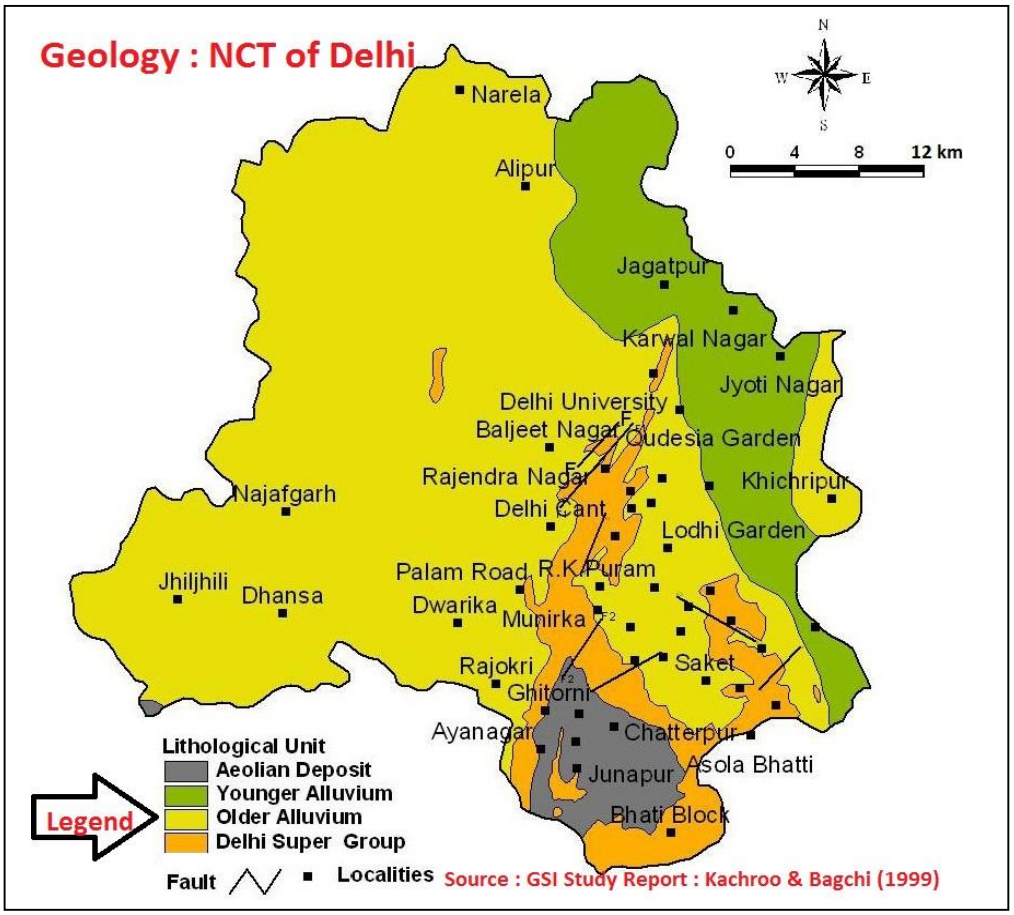
3.3 Geology

The rock formations exposed in the National Capital Territory of Delhi are mainly quartzite inter-bedded with thin bands of micaceous schist. These Proterozoic age rocks occur along the ridge, extending from Harchandpur (Haryana) in the South to Wazirabad (Delhi) in the North. Quaternary sediments consisting alluvium deposit directly overlie the Proterozoic rocks. Systematic geological and geomorphologic studies carried out by the Geologists of Geological Survey of India has revealed three Stratigraphic horizons and underlying three distinct lithostratigraphic units of NCT Delhi. The highest of these is the erosional surface forming the top of denudational hills. The second surface is Older Alluvial plain and the third is depositional Younger Alluvial plain (Yamuna). All three litho-stratigraphic units corresponding them have undergone changes due to widespread and uncontrolled urban activity over the period. The geological map of Delhi after Kachroo and Bagchi (1999), showing these main units is shown in Fig. 11 and generalized stratigraphy of NCT of Delhi is presented in Table 8.

Table: 8 Generalized Stratigraphic Units of NCT Delhi (compiled after GSI Study)

Alluvium	Newer Alluvium	Unconsolidated, inter-bedded lenses of sand, silt gravel and clay confined to narrow flood plains of Yamuna river and Aeolian deposit of South Delhi.
	Older Alluvium	Unconsolidated thickness varies upto 300m. Inter-bedded, inter-fingering deposits of sand, clay and kankar, poor to moderately sorted.
Delhi Super Group	Alwar Quartzite	Well stratified, thick bedded, brown to buff colour, hard and compact, intruded locally by pegmatite and quartz veins inter-bedded with mica schist.

Fig. 11



3.3.1. Alluvium Deposits

In NCT Delhi region, exposures of the oldest lithostratigraphic unit, the Delhi Quartzite ridge acts as main recharge zone to subsurface aquifer system. The Quaternary deposits in the form of aeolian and alluvial deposits constitute the major repository of ground water in the area. In the East of the ridge, the thickness of unconsolidated sediments gradually increases away from the ridge, with the maximum reported thickness being 170 m. In the Southwestern, Western and Northern parts of the area, the thickness of sediments is more than 300 m except at Dhansa where the bedrock has been encountered at 297 m below land surface. In Chhattarpur basin, the maximum thickness of sediments is 116 m. The aeolian deposits of South Delhi are mainly comprised of loam, silty loam and sandy loam. The bedrock is overlain by these deposits. Older alluvial deposits consist mostly of inter-bedded, lenticular and inter fingering deposits of clay, silt, and sand along with kankar. These deposits are overlain by the newer alluvium, which occurs mostly in the flood plains of river Yamuna.

3.3.2. Hard Rock Formation

Quartzite is one of the most physically durable and chemically resistant rocks found in NCT of Delhi. The suits of quartzite and associated mica schist /phyllite bands of Delhi system have undergone multiple folding and different phases of metamorphism. When the mountain ranges are worn down by weathering and erosion, less-resistant and less-durable rocks are destroyed, but the quartzite remains. Therefore Delhi Quartzite is so often the rock found as linear ridges ranges and covering their flanks as a litter of scree. One of the research study on weathering of Proterozoic quartzite in the semi-arid conditions around Delhi suggested that Quartzite being a resistant rock, dissolution of small amount of pyrites presence, by moving water produced a sulphate-bearing acidic solution and ferrous iron which reacted with alumino-silicate minerals and quartz respectively and has made the Delhi Quartzite porous and subsequent friable. The coupled weathering mechanism, from the core outward and also proceeded initially from fractures towards the inside, produced weathering rinds and subsequent physical erosion of loose sand, produced during rind development in the outermost zones, has given rise to features like tors, spheroids, gullies, cavities and small-scale caves on these quartzites. Thus, the terrain has acquired ruggedness in semi-arid conditions.

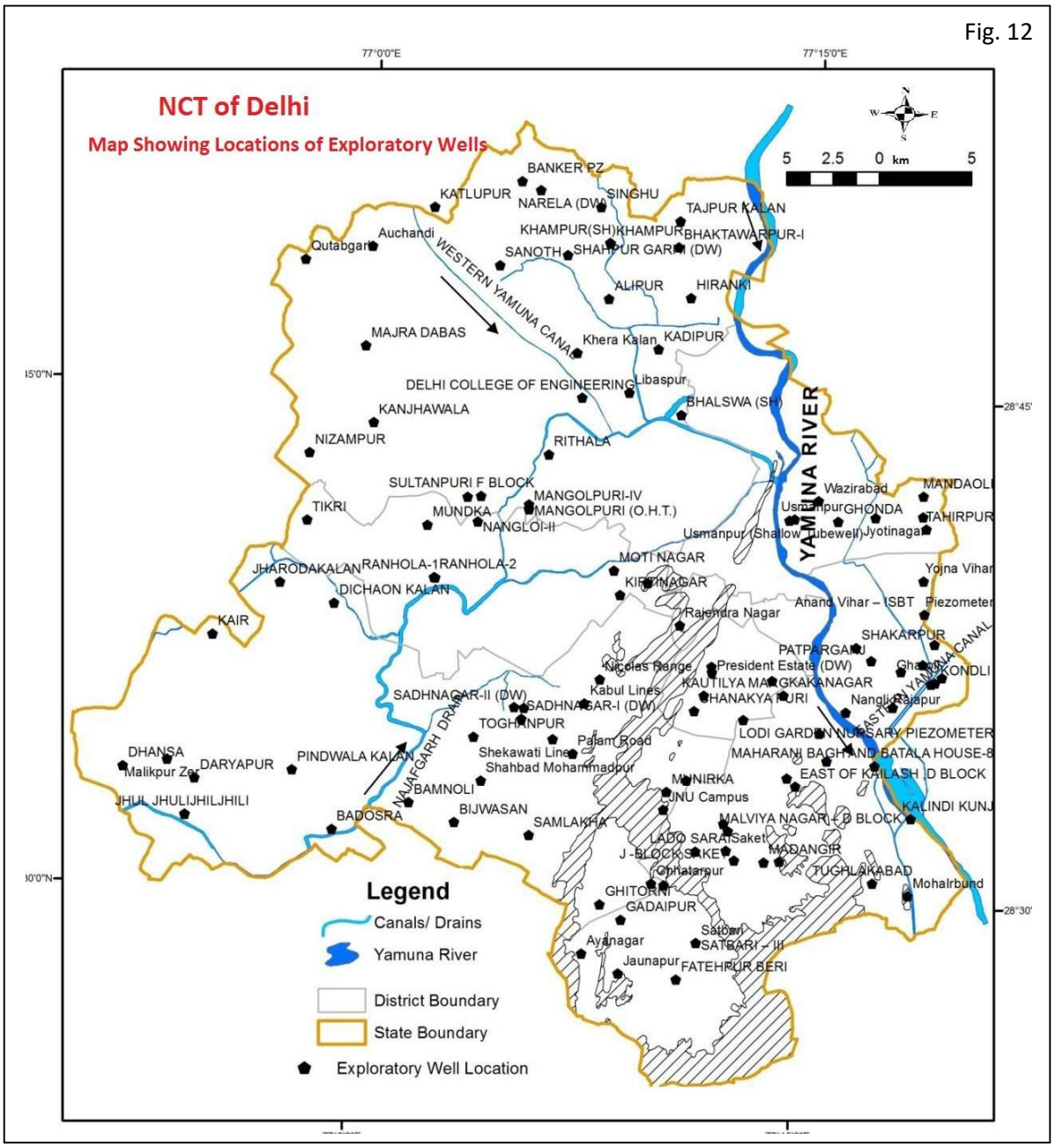
In one of the studies of GSI, it is reported three generations of folding in the rocks of Delhi. The fold axes of first-generation folds follow the trend of main ridge i.e. NNE-SSW, the second-generation folds trending NE-SW are observed at Tughlaqabad - Mehrauli area, and third generation fold trending NW-SE is observed at Anand Parbat. The rocks are highly jointed and two sets of conjugate vertical to sub-vertical joints have been reported. Another study of GSIhas inferred several faults trending NNE-SSW, NE-SW and WNW-ESE.

3.3.3. Subsurface Aquifer Dispositions

Central Ground Water Board had been engaged in Ground Water Exploration in National Capital Territory of Delhi since its inception in 1972 and till date more than 327 boreholes are drilled out of which 151 are Exploratory Well (EW), 176 are Observation Well (OW) / Piezometers (Pz) / Slim holes. Locations of exploratory boreholes are shown in Fig. 12. All these boreholes were electrically logged to identify granular zones with fresh ground water and other lithological characteristics of subsurface litho units. All these studies have revealed that there is distinct variations in sub surface lithology characteristics and thickness of individual subunits of the main aquifer zone, within the Younger and Older alluvium deposits of NCT Delhi (refer Fig. 11) which make the aquifer geometry of Delhi complicated and complex. Younger Alluvium confined to the flood plains of Yamuna River and also along the courses of major streams, comprises of clay/silt mixed with small mica flakes, and medium to coarse-grained sand and gravel whereas Older Alluvium comprises interbedded and lenticular deposits of clay, silt and sand ranging from very fine to very coarse with occasional kankar. In general, the Younger alluvium, the disposition of different sediments particularly the pervious layer constituting the unconfined aquifer is well delineated in the Yamuna flood plain area while in the

older alluvium, the disposition of different lithological units is not well defined, and they are heterogeneous in nature, making it difficult to identify the deep aquifer zones which are regionally extensive, both vertically and laterally. In the Yamuna flood plain, Younger Alluvium thickness is about 40m thick and underlain with silty clay with kankar whereas the thickness of the Older Alluvium, mainly west of Delhi Ridge is highly variable and is dependent mainly on the configuration of the basement; at Shahbad Mohammadpur near IGI airport the thickness of the older alluvium is 560 meters overlying the bed rock. Whereas in areas underlain by hard rock units, mainly South, South East, Parts of New Delhi and Central district of NCT of Delhi, the aquifers are defined by the presence of fractured zones at different depths. These fractured zones at places are locally well defined but not regionally extensive.

Fig. 12

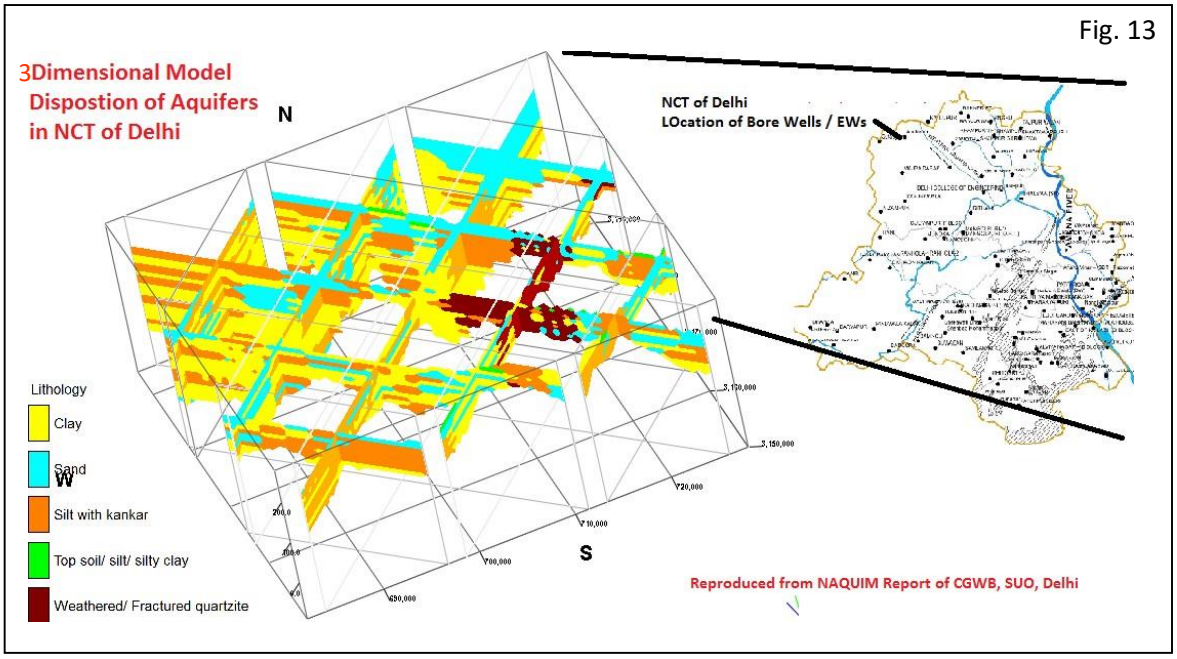


The subsurface configuration of aquifers, in entire NCT of Delhi has been deciphered on basis of available lithological and geophysical logs of exploratory wells drilled by Central Ground Water Board under the Ground Water Exploration Programme. To mark the aquifer geometry, on the basis of

these litholog data, the different sediments i.e. clay, silt, kankar and different grades of sand, and their admixture has been categorized as pervious (silt + kankar + sand) and impervious (mostly clay with some silt + kankar). In the areas underlain by hard rock formation, upper most wreathed regolith and quartzite with fractured zones at different depths and associated mica schist band constitutes unique hard rock aquifer system.

In recent study taken by CGWB under NAQUIM Project, the detailed aquifer geometry on regional scale has been established in the NCT, Delhi. All available information about subsurface aquifer configuration, deciphered on basis lithological and geophysical logs of exploratory wells drilled by Central Ground Water Board under the Ground Water Exploration Programme along with interpreted records of various geophysical studies etc., are integrated to prepare the aquifer map. From the geological sections and fence diagrams prepared, principal aquifers in the area have been delineated by grouping the fine, medium, coarse sand and sand with gravels as sand. Top soil and silty clay or silt at the surface have been grouped together. Weathered and fractured quartzite and the massive quartzite/ bedrock have been grouped together as weathered/ fractured quartzite (Fig.13).

Fig. 13



3.3.4. Fresh –Saline Ground Water Interface

Various hydrogeological and groundwater exploration studies in NCT of Delhi by CGWB has revealed that the thickness of fresh water in major part of the State varies from 20 to 40 m It is also observed that no fresh water is available in a few pockets in Narela and Alipur tehsils of North District, Saraswati Vihar tehsil of Northwest district, Punjabi Bagh and Patel Nagar tehsils of West District, Najafgarh tehsil of Southwest district and Kalkaji tehsil of Southeast District. (Fig. 14).

In one of the recent studies undertaken under NAQUIM projects by WAPCOS, the granular zones (the aquifers) with varied resistivity were picked up from the combined interpretations of electrical resistivity (64 inches Normal) and gamma radioactivity logs of the boreholes drilled in the area. It shows that resistivity values greater than 10 ohm m to 50 ohm m represents predominately sand with fresh ground water. Resistivity less than 10 ohm m indicates predominately clay and kankar with saline water. Further lowering of resistivity values to 1 ohm m indicates further deterioration of water quality with depth. Resistivity of the order of 50 to 500 ohm m in hard rock (quartzite) area is represented by weathered/ fractured/ jointed quartzite which forms potential aquifer with potable water. In general, it is clear that fresh water sediments are followed by the saline water sediments in

all over NCT of Delhi. The thickness of fresh water sediments is limited in major parts of NCT, Delhi. The depth to fresh-saline water interface varies from 10 m bgl to 80 m bgl. Ground water quality below fresh saline water interface is saline all through up to the bedrock. At a few locations like Dhansa, Qutabgarh and Bankner, saline ground water is present at a very shallow depth. Panel diagram showing fresh-saline ground water interface in subsurface aquifer system of NCT of Delhi, is presented in Fig. 15.

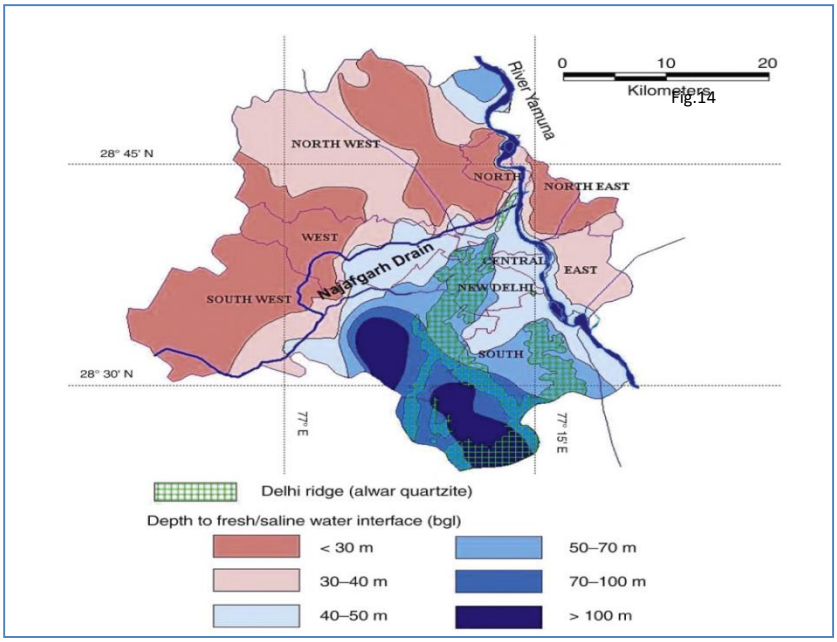


Fig.14

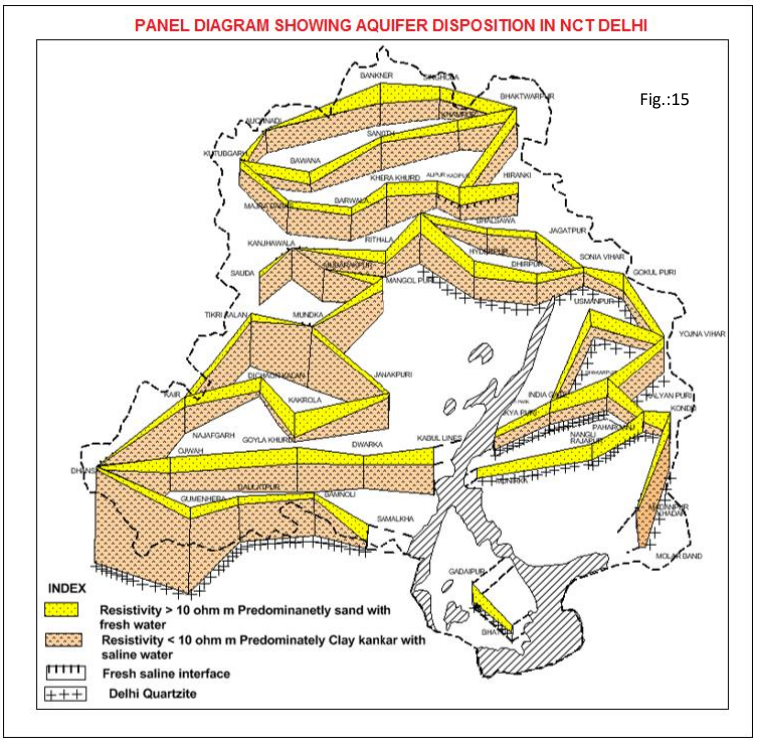


Fig.:15

Perusal of Fig. 15 shows that in the South West district of NCT Delhi, bedrock is encountered at many places i.e. in Dhansa, Samalkha, Kabul lines, Jhuljhuli where fresh/saline water interface also varies greatly in entire area. All along the Najafgarh Drain and two depressions i.e., Gummanhera and Pindwalan Kalan, fresh water layer is somewhat deeper i.e. up to 35 m bgl but rest of the area is having

thin layer of fresh water i.e. up to the depth 25 to 28 m bgl only. In the western parts of the district, the thickness of fresh water zone is limited. At a few locations like Dhansa, the saline ground water is present at a very shallow depth and as we move towards areas in the eastern part of the district, where hard rock is present, the thickness of fresh water aquifers is more, and fresh-saline water interface occurs at deeper depth i.e. generally around 80 to 90 m bgl. At Rajokri, the depth of fresh-saline water interface has been observed to be 150 m bgl.

In West district, the depth of fresh-saline interface varies from 25 to 50 m bgl. The depth of fresh water zone varies from 10 to 45mbgl. The thickness of fresh water aquifers is more at places like Dichaon Kalan and Kakrola and fresh-saline interface is at deeper depths. While in the areas around Janakpuri, Mundka, the saline water is present at shallow depths.

In South district, depth of fresh-saline water interface varies from 75 to 100 mbgl. The thickness of fresh water zone varies from 30 to 85 m. At locations like Gadaipur, Bhatti and Munirka, fresh water aquifers are followed by hard rock (Delhi quartzite). In Southeast district, at places around Madanpur Khadar, the thickness of fresh water zones is limited. Here, fresh water aquifers are followed by saline water zone and bedrock is encountered at depth of around of 300 m.

In North West district, the depth of fresh-saline water interface varies greatly. The thickness of fresh water aquifers is limited in this district. At locations like Auchandi, Qutabgarh&Bankner, the saline water is present at shallower depths. In areas along Yamuna Flood Plain, fresh-saline water interface is at deeper depth i.e., around 40 to 70 m bgl, whereas in rest of the area it is 22 to 40 m. No bedrock has been observed up to the depth of 250 mbgl.

In Northeast district, thickness of fresh water aquifers is more in areas around Yamuna Flood Plain. The depth of fresh-saline water interface in Yamuna Flood Plain ranges between 32 and 50 mbgl whereas in rest of the area, it ranges from 25 to 38 m bgl.

In New Delhi and Central Districts, fresh water sediments are followed by saline water and then by quartzites (Delhi Ridge). In East & Shahdara districts, thickness of fresh water aquifers is more at locations like Kalyanpuri, Kondli and Shakurpur up to 60 mbgl.

3.3.5. Basement Topography

The Pre-Cambrian basement rocks are exposed in form of series of isolated hillocks with different dimension, usually termed as Ridge, trending almost in NNE- SSW direction in NCT of Delhi. Main exposures are Northern Ridge near Delhi University (0.87 Sq. Km), Central Ridge near Dhaula Kuan (8.69 Sq. Km), South Central Ridge near Vasant Kunj (6.26 Sq. Km) and Southern Ridge near Asola (62 Sq. Km). The strike of these rocks varies from north-east and south-west to north north-east and south south-west with steep dips towards east and south-east except for some local variation due to folding.

Central Ground Water Board carried out a regular programme to drill exploratory wells in NCT Delhi and its surrounding States. So far, in NCT of Delhi alone, nearly 327 wells have been drilled in various parts of Delhi, which covers diverse terrain i.e. Yamuna flood plain, older alluvium area, Chattarpur Enclosed Basin and Delhi Quartzite terrain, for their aquifer evaluation and quality determination of ground water. Moreover, as a short-term basis electrical resistivity survey was also carried out along Najafgarh Drain and along Rajpath (India gate) as well as in different parts of south district. All these has helped to configure extension of basement rock topography, below variable thickness of alluvium, from the land surfaces of exposed ridge in all the stretches in& around NCT of Delhi. Earlier, during 2000, bed rock configuration map prepared on the basis of subsurface geological data generated from exploratory drilling and supplementary geophysical data input, indicated that the contour of the bed rock up to 200 m almost follows the Ridge alignment indicating the slope of the bed rock to be uniform. As such, taking into consideration of geological and tectonic processes undergone by basement rocks during the Pre-Cambrian and subsequent periods, the basement topography of NCT, Delhi is presumed to be highly uneven with the presence of sub-surface ridges and valleys. A simplified basement topography map, an abridged information derived by all available explorations & survey reports, mainly by using exploratory data of NCT Delhi, reproduced from old report of CGWB is shown in Fig. 16. Taking into account of thickness of alluvium overburden, the area of NCT Delhi has been classified into three zones Viz, A, B, C, which is shown in the Table 9.

Fig. 16

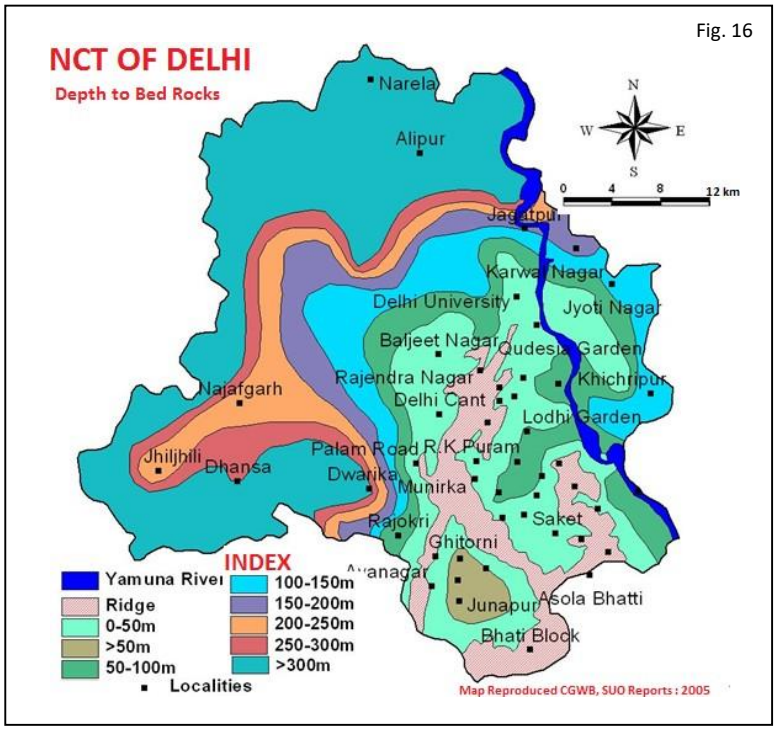


Table: 9 Thickness of Alluvium overburden over Bed rock

Zone	Depth of Bed rock or overburden in mbgl	Area of NCT Delhi
Zone A	< 30	Lal Quila, Delhi Gate, Feroz Shah Kotla, Ramlila Ground, Ajmeri Gate, Sadar Bazar, Dhir-pur, Timarpur, Majnu Ka Tilla, Gandhi Nagar (Rail Bridge), Nehru Park, Sabji Mandi, Chandani Chowk-Sadar Bazar, GreaterKailash-Kalkaji, North of Connaught Place & Moti Bagh.
Zone B	30 to 100	Usmanpur, Loni border, Metro rail Depot, Mayur Vihar Phase-II (Block BD), Geeta colony, Khajuri Khas, Shakarpur Khas, Gadaipur, Jaunapur, Ayanagar,Hauz Khas, Vayusena Bad. Jamia Univ. (Okhala), Arvindo Marg, Gulabi Bagh, Trilokpuri, Mayur Vihar-Ph-II,Ghazipur, Kondli (Loni Bdr).
Zone C	> 100	Madanpur Khadar, Jagatpur, Jaitpur, West of Najafgarh Nala, Kirbi Place, Palam Village, Shastri Nagar, CBD Shahdara, Ananda Vihar, Dilshad Garden, Bawana, Nangloi, Tikri Kalan.

4. GROUND WATER BEHAVIOUR DURING 2023-24

The monitoring of ground water levels has been carried out four times in a year simultaneously throughout the NCT of Delhi during following periods.

a) May - 20th to 30th (water level of pre-monsoon period)
b) August - 20th to 30th (peak monsoon water level)
c) November - 1st to 10th (water levels of post-monsoon period)
d) January - 1st to 10th (the recession stage of water level)

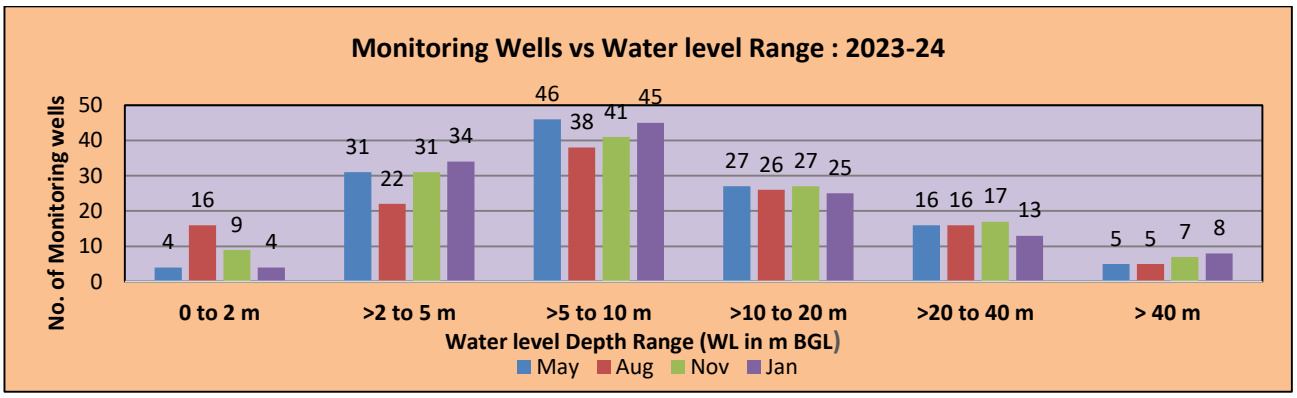
The data is analyzed for each set of measurement, and report prepared which include following maps to understand the groundwater regime in NCT of Delhi.

a) Depth to water level – water level with reference to ground level.
b) Seasonal fluctuation - water level fluctuation in comparison to pre-monsoon.
c) Annual fluctuation - water level fluctuation in comparison to same month in the previous year.
d) Decadal fluctuation - water level fluctuation in the month of measurement with reference to the decadal average for the same month.
e) Ground Water Flow Net – water level with reference to mean sea level.

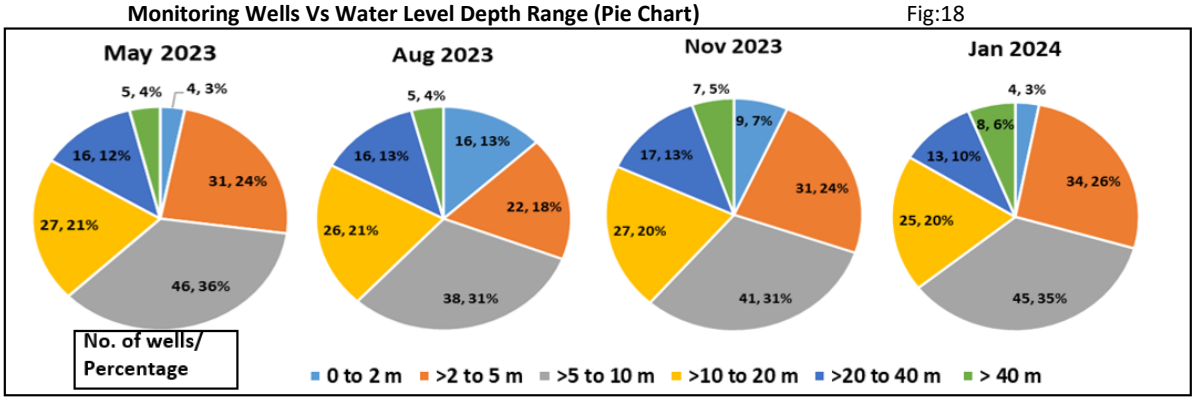
4.1 Depth to Water Level

The analysis of number of monitoring wells in the different categories of the water levels for all four monitoring periods of year 2023-24 (January, May, August & November) reveals that zone (shallow aquifer) having depth to water level up to 5 meters bgl varies considerably over two monitoring periods which shows that upper zone (shallow aquifer) is actively responding to stresses on ground water system. The changes in water levels in the depth range of 5mbgl to 10mbgl and 10mbgl to 20mbgl and >20 mbgl, during 3 monitoring period as compared to May is not prominent. This may be interpreted as stressed water level conditions suppressing dynamic changes in water levels. Whereas number of monitoring stations showing water level below 40 m remain almost same in all four-monitoring period, indicating very high stressed water conditions in deep aquifers (Hard Rock Aquifer) of NCT Delhi Annexures IV(A,B,C,D).

Fig. 17



Monitoring Wells Vs Water Level Depth Range (Pie Chart) Fig:18



4.1.1. May 2023

The Depth to water level recorded in NCT Delhi during **May-2023** ranges from 1.08 m bgl at Bhalaswa lake to 66.84 m bgl at Gadaipur. A map showing May 2023 ground water levels in NCT of Delhi is given in Fig. 19 and areas under various depth zones is presented in Fig. 20. Around 15 % of NCT Delhi have shallow water level up to 5 m bgl which falls in parts of North West, North, West, Central, South West & South East. Deep water levels of 20 mbgl to 66 mbgl is observed in around 17 % of NCT Delhi, which falls mainly in South & New Delhi districts & small pockets of South East, North East, South West and Shahdara districts. In rest of NCT Delhi, i.e. 68 % of areas have water level ranging between 5 m bgl to 20 m bgl.

Fig. 19

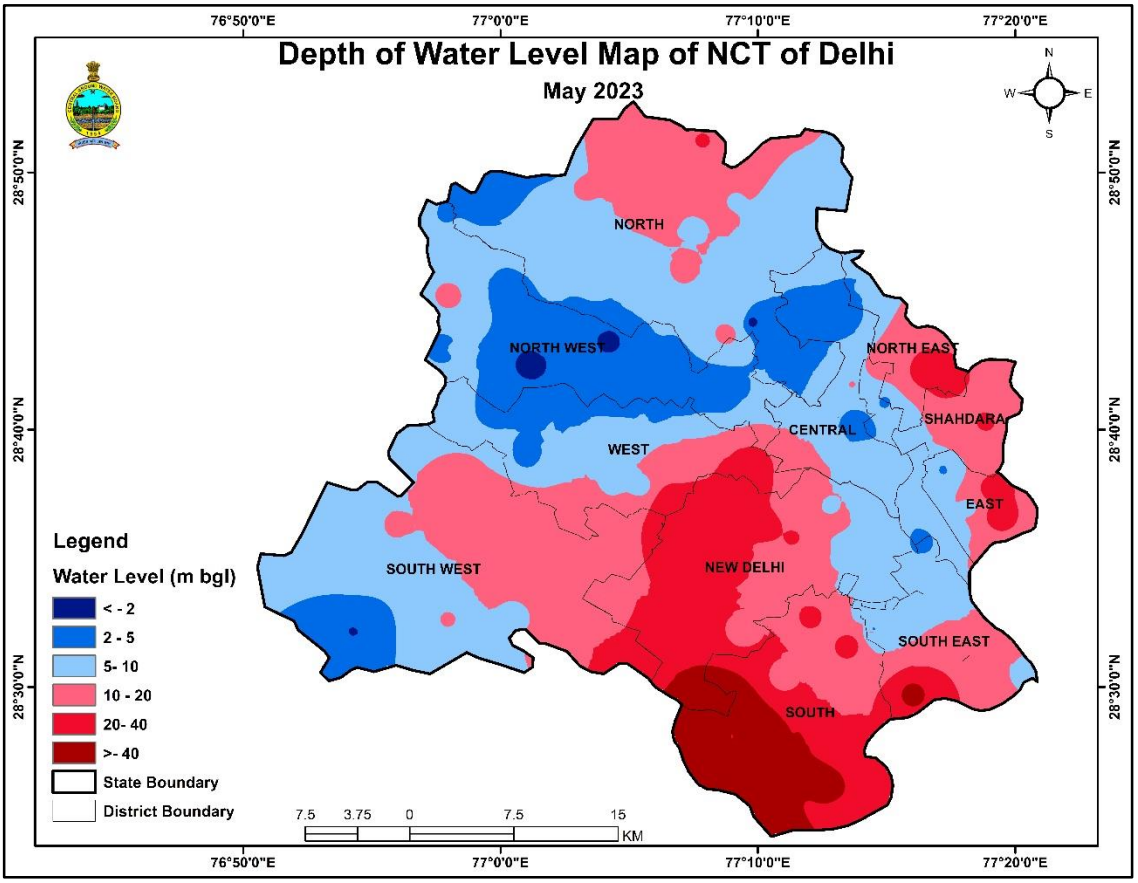
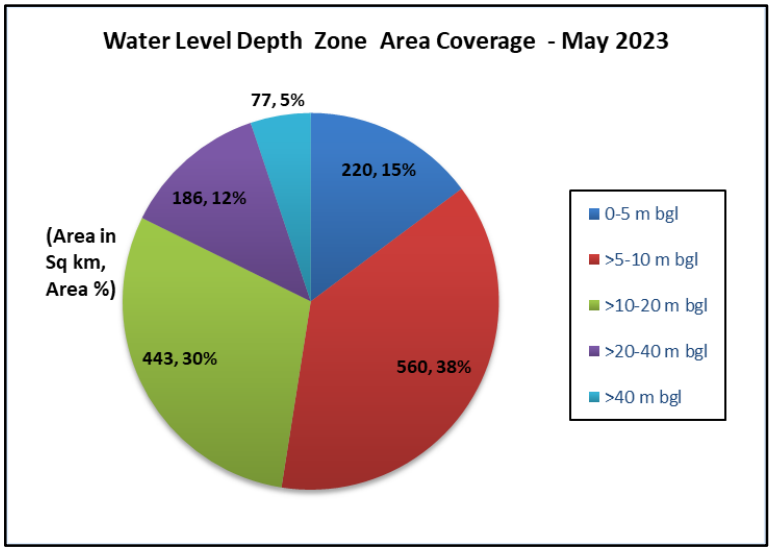


Fig. 20



4.1.2. August 2023

The Depth to water level recorded in NCT Delhi during **August-2023** ranges from 0.53 mbgl at Raota to 67.2 mbgl at Gadaipur. A map showing August 2023 ground water levels in NCT of Delhi is given in Fig. 21 and areas under various depth zones is presented in Fig. 22. Around 22 % of NCT Delhi areas have shallow water level up to 5 m bgl, which falls in parts of North, North West, Central, and South West districts. Deep water levels of 20 to 67 mbgl observed in around 18 % of NCT Delhi, which falls in New Delhi, South, South East and the small pockets of East, Shahdara & North. In rest of NCT Delhi, 60 % areas have water level in range of 5 to 20 mbgl.

Fig.21

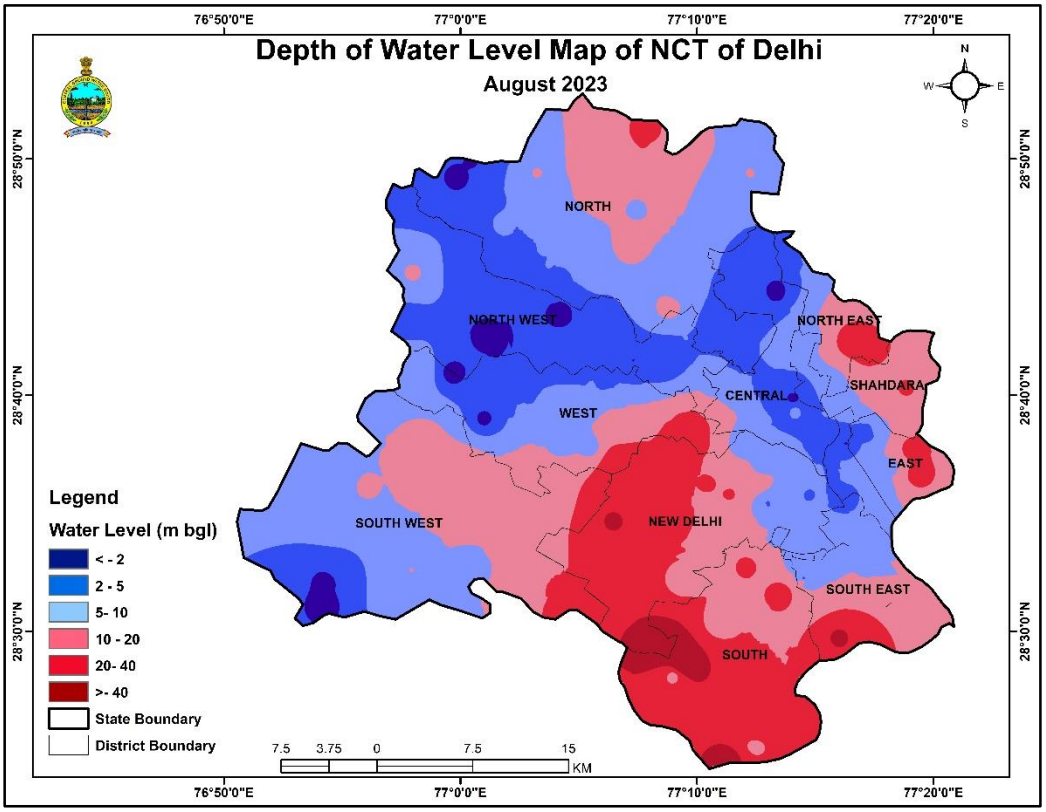
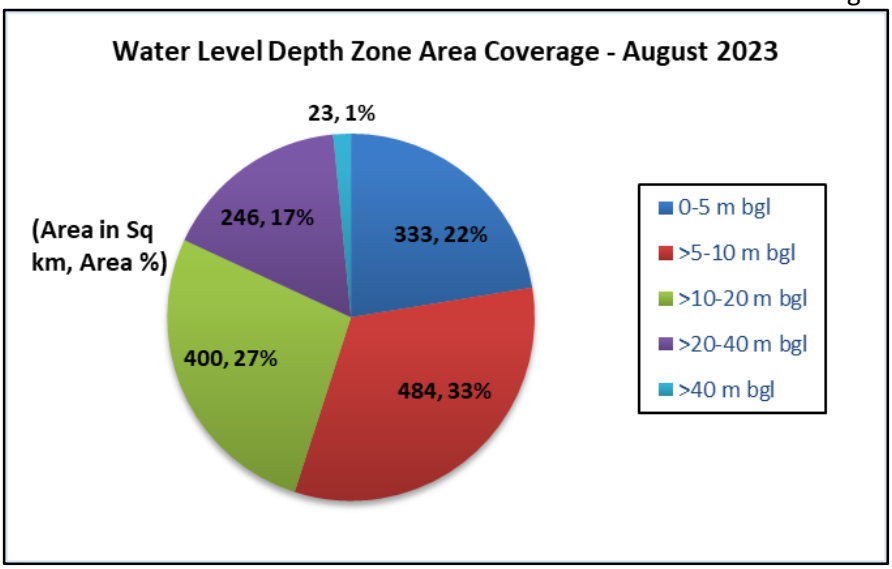


Fig. 22



4.1.3. November 2023

The Depth to water level recorded in NCT Delhi during **November-2023** ranges from 0.84 mbgl at Rohini Sector 23 to 67.41 mbgl at Gadaipur. A map showing November 2023 ground water levels in NCT of Delhi is given in Fig. 23 and areas under various depth zones presented in Fig. 24. Around 18 % of NCT Delhi, which falls in parts of North West, North, West, Southwest and small pockets of Central districts have shallow water level up to 5 m bgl. Deep water levels of 20 to 67 mbgl observed in around 19 % of NCT Delhi, which falls in South, New Delhi, South East, Shahdara, East & North districts. In rest of NCT Delhi, 63 % areas have water level in range of 5 to 20 mbgl.

Fig.23

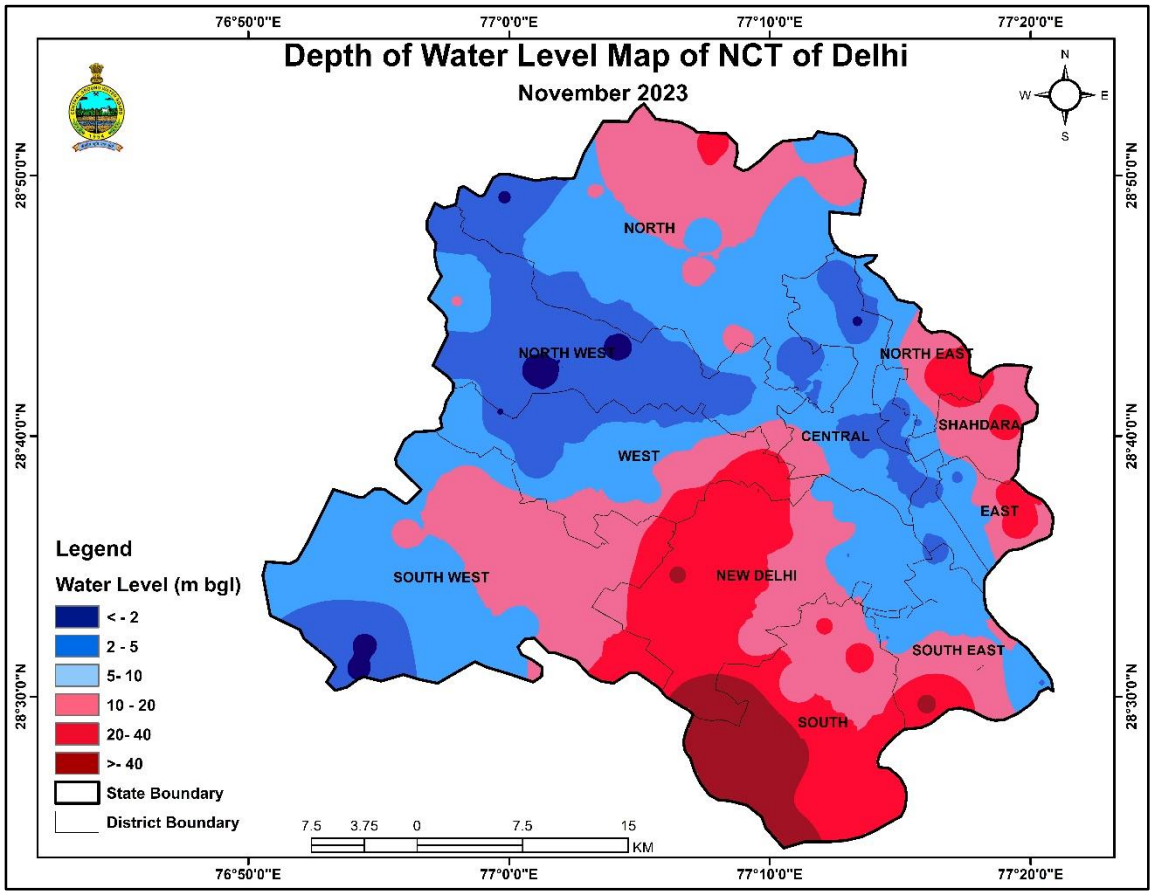
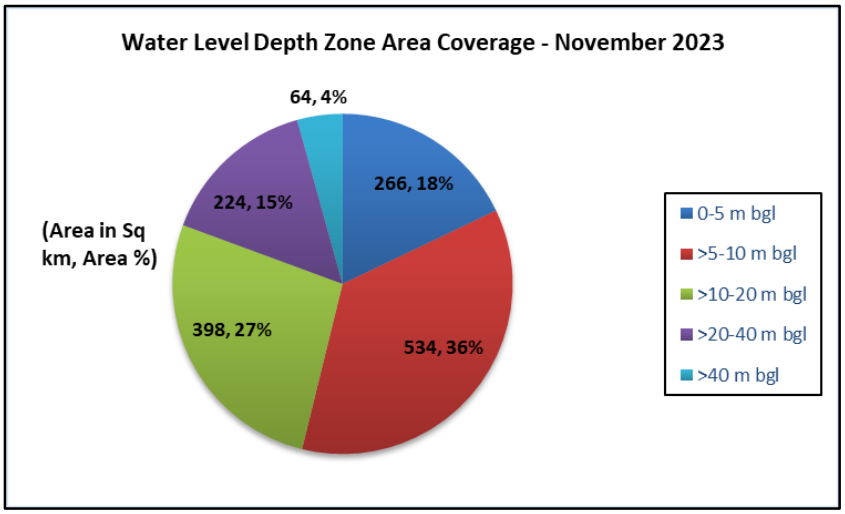


Fig.24



4.1.4. January 2024

The Depth to water level recorded in NCT Delhi during **January-2024** ranges from 1 mbgl at Rohini Sector-23 to 68.17 mbgl at Gadaipur. A map showing January 2024 ground water levels in NCT of Delhi is given in Fig.25 and areas under various depth zones presented in Fig. 26. Around 15 % of NCT Delhi, which falls in parts of North West, North and some small pockets of Central, South West & South East districts have shallow water level up to 5 m bgl. Deep water levels of 20 to 68 m bgl observed in around 18 % of NCT Delhi, which falls in South, New Delhi, South East and small pockets of North, Shahdara & East districts. In rest of NCT Delhi, 67 % areas have water level in range of 5 to 20 m bgl.

Fig. 25

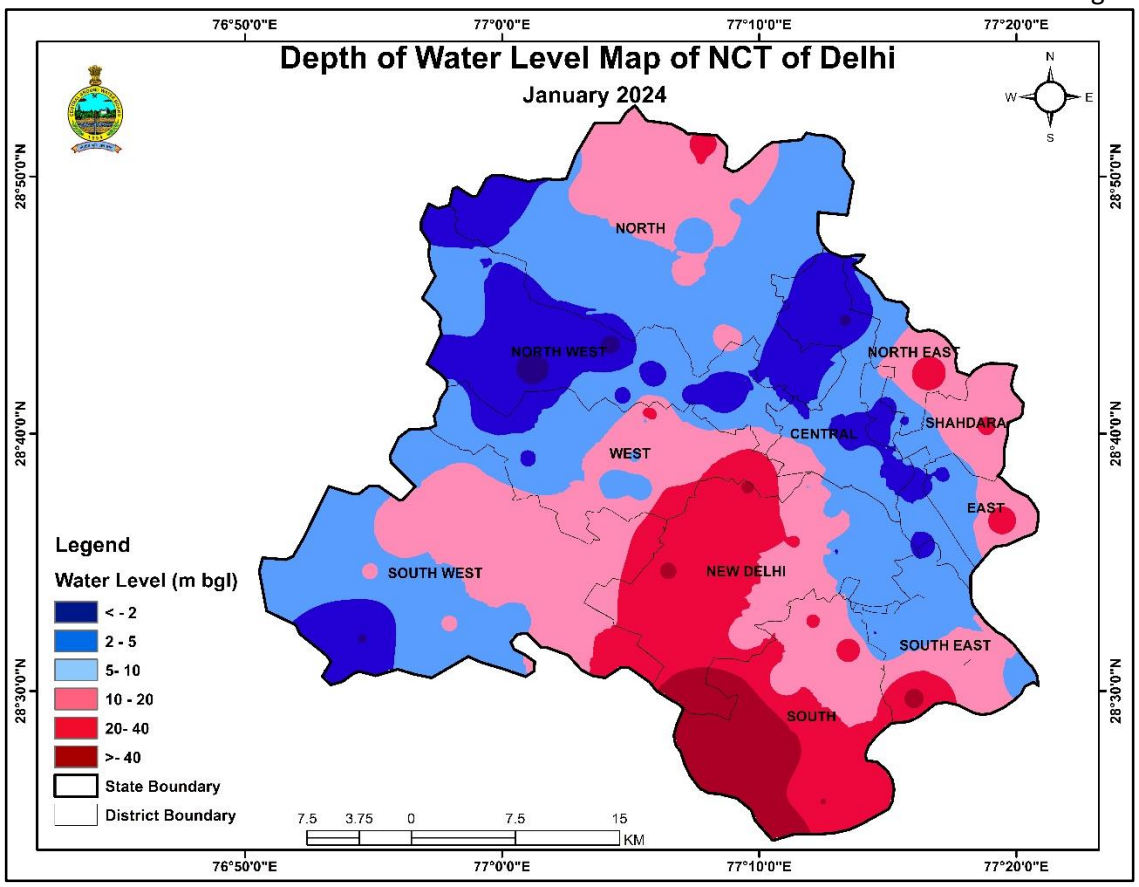
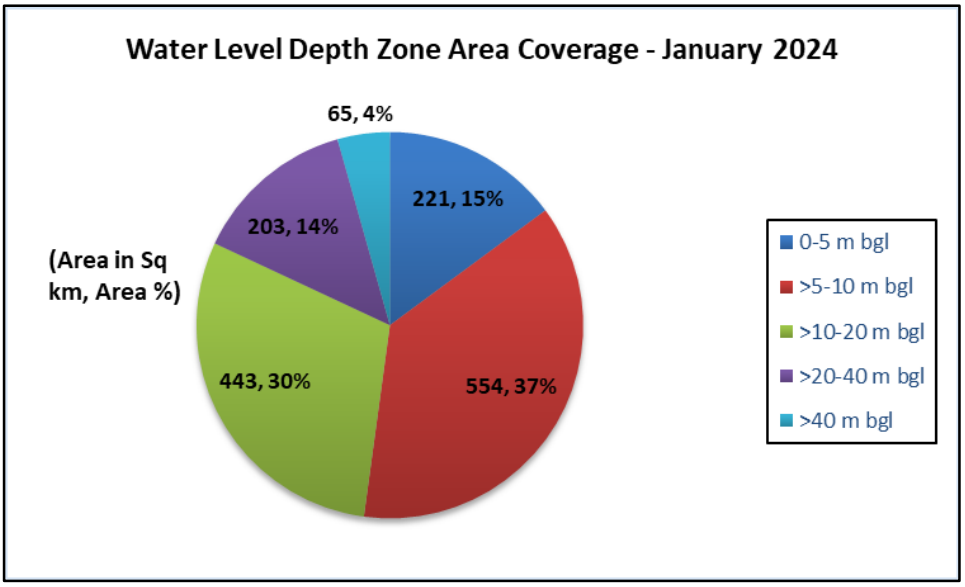


Fig. 26



4.2 Seasonal Water Level Fluctuation: 2023-24

The seasonal water level fluctuation, i.e. the changes in depth of water levels of August 23, November 23 and January 24 with respect to May 23 water level reveals the effect of subsequent utilization of groundwater for various needs like Industrial, Irrigation, Domestic etc., on overall groundwater regime of the area. Number of wells showing change in groundwater levels in the region over different periods is presented in Fig. 27 (a, b & c) and Table 10.

Figure: 27 a

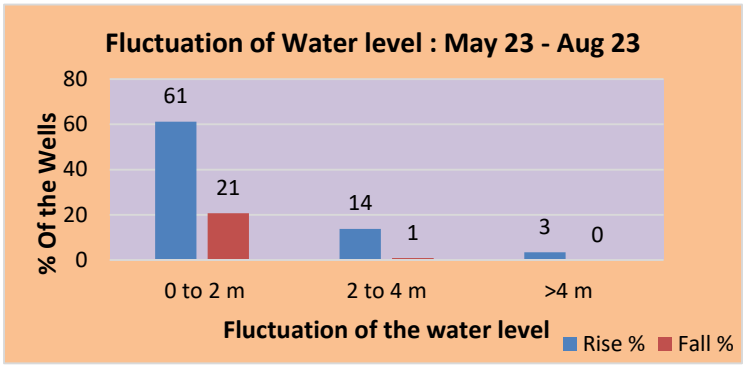


Figure 27b

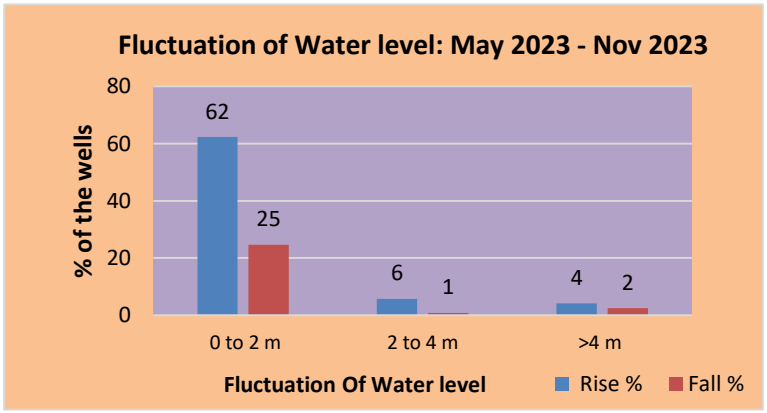


Figure: 27 c

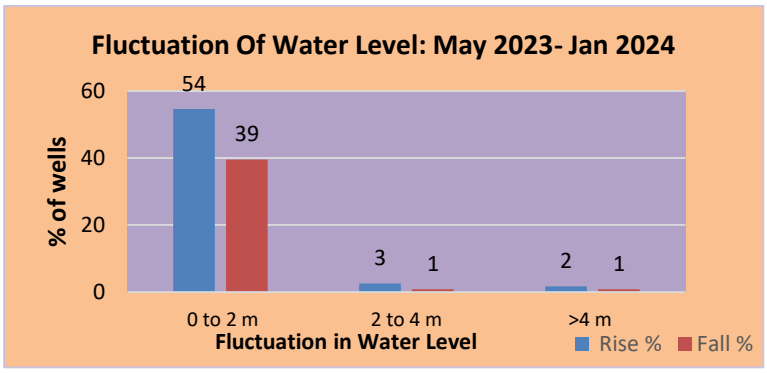


Table: 10 Monitoring Wells Showing Seasonal Fluctuation in Water Level

Water Level Fluctuation Range	May 23 -Aug 23		May 23-Nov 23		May 23 - Jan24	
	Rise	Fall	Rise	Fall	Rise	Fall
0 to 2 m	71	24	76	30	65	47
> 2 to 4 m	16	1	7	1	3	1
>4 m	4	0	5	3	2	1
Total	**91**	**25**	**84**	**34**	**70**	**49**

4.2.1. May 2023 to Aug 2023

A perusal of Fig. 27(a) and Table 10 reveals that comparing water levels of May 23 to August 23, Of the total. 78 % of monitoring wells of the NCT Delhi show a rise in water level whereas rest 22 % shows declining water level. The extent of rise and fall in water levels is shown in map presented in Fig. 28 and in pie chart (Fig. 29).

Fig. 28

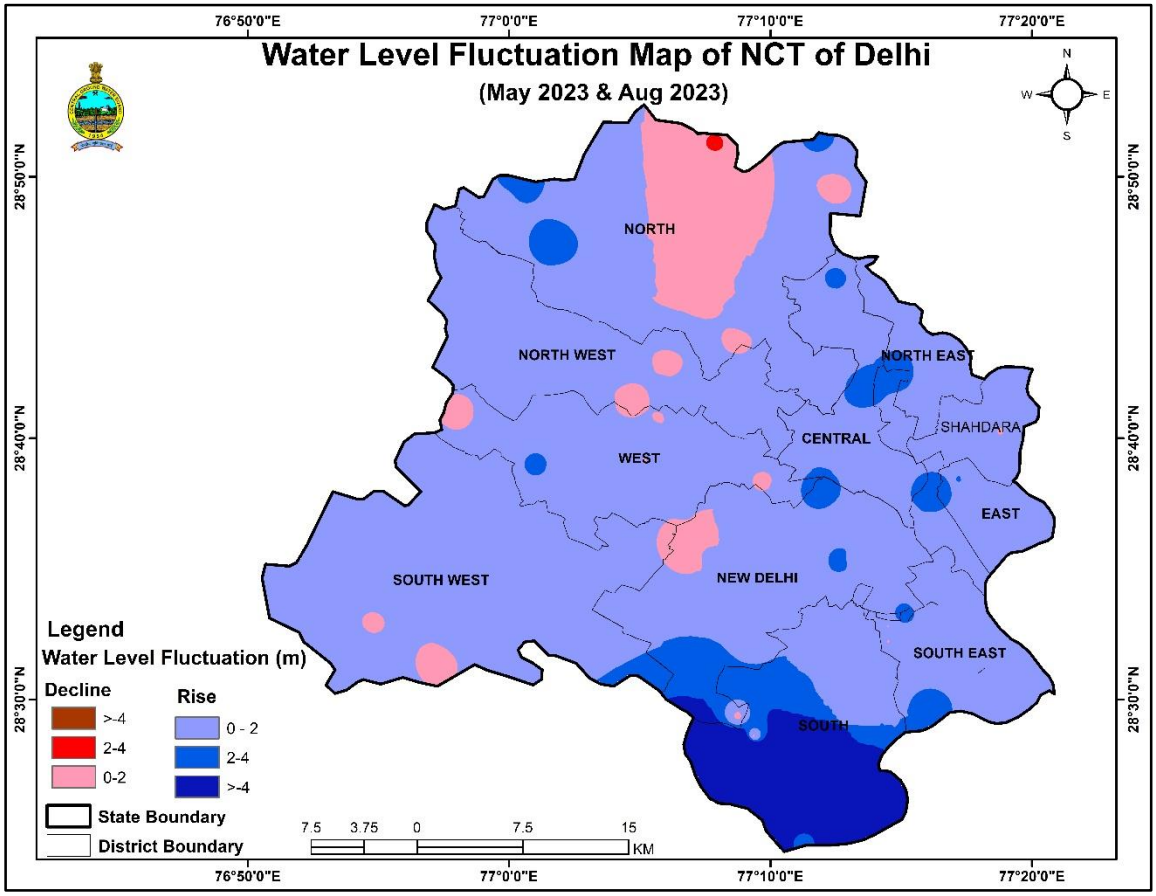
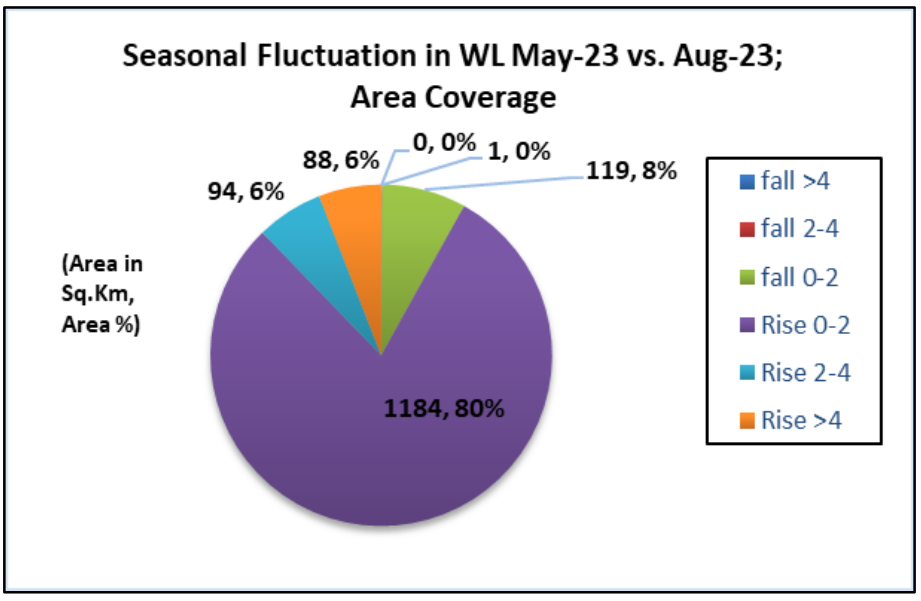


Fig. 29



4.2.2. May 2023 to November 2023

A perusal of Fig. 27(b) and Table 10 reveals that comparing water levels of May 23 to November 23, Of total 72 % of monitoring wells of the NCT Delhi show a rise in water level whereas rest 28 % shows fall in water level. The extent of rise and fall in water levels is shown in map presented in Fig. 30 and in pie chart (Fig.31).

Fig. 30

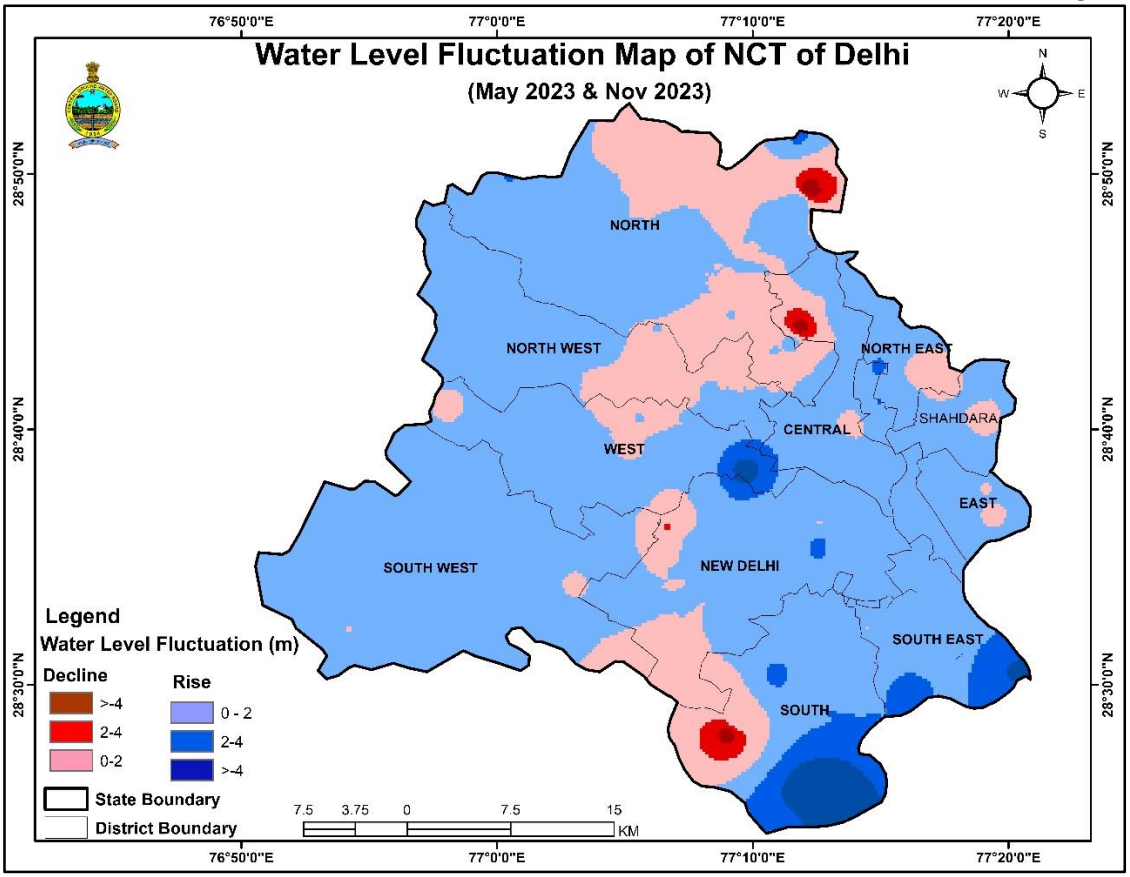
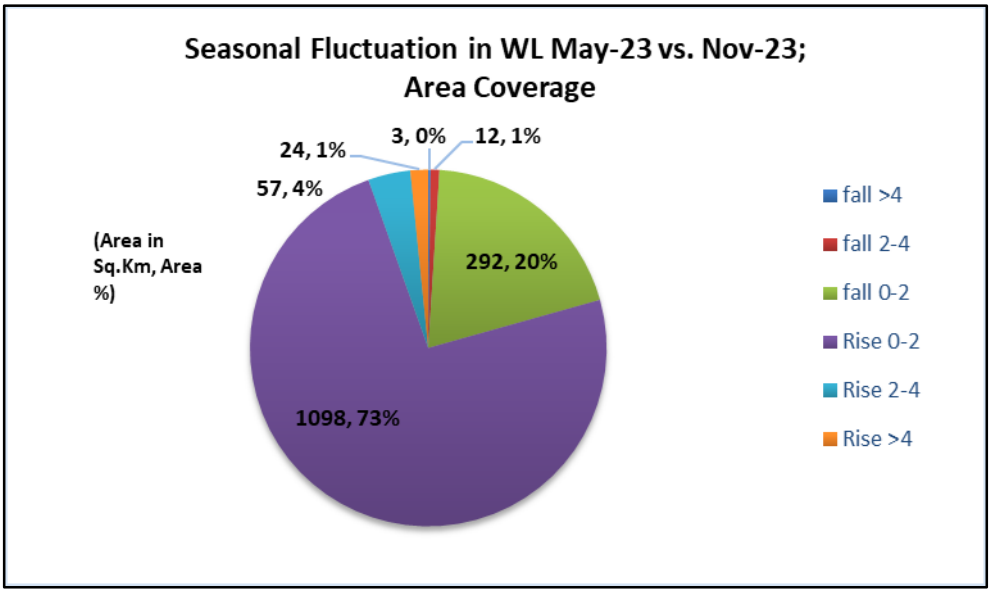


Fig. 31



4.2.3. May 2023 to Jan 2024

A perusal of Fig. 27c and Table 10 reveals that comparing water levels of May 23 to January 24, Of total 59 % of monitoring wells of the NCT Delhi show a rise in water level whereas rest 41 % shows declining water level. The extent of rise and decline in water levels is shown in map presented in Fig. 32 and in pie chart (Fig.33).

Fig. 32

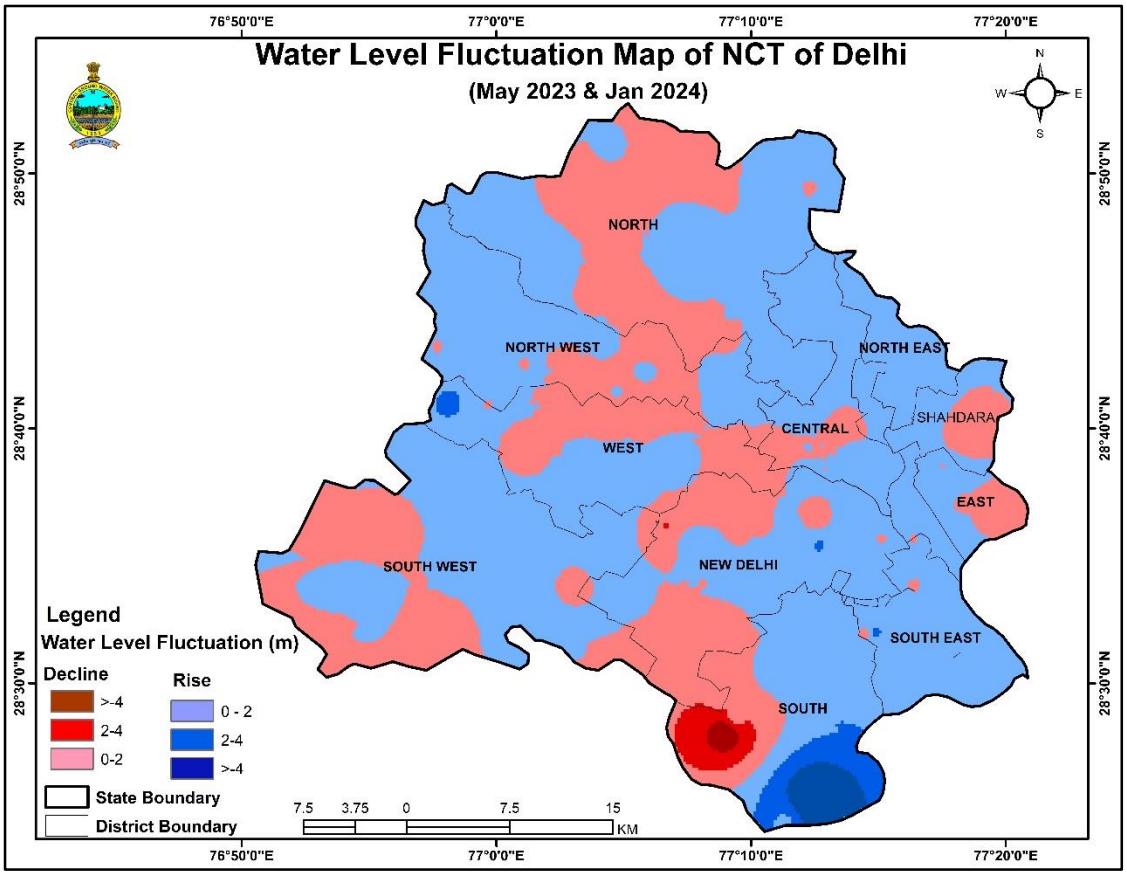
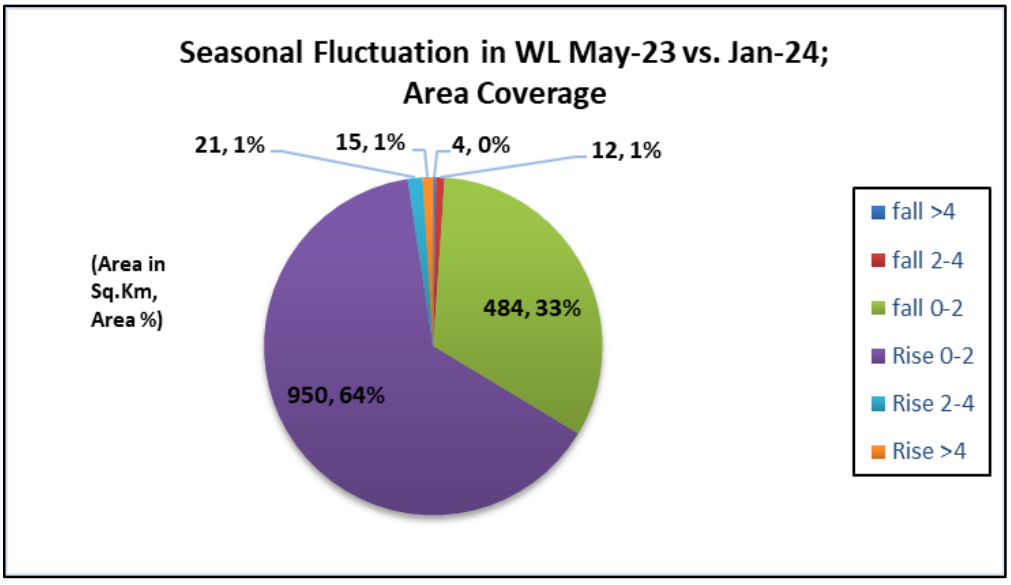


Fig. 33



4.3 Annual Water Level Fluctuation: 2022-2023

Annual Fluctuation in the water levels of the ground water monitoring wells during 2023-24 for different monitoring periods were compared with same period of 2022-23 and wells showing change in groundwater levels over different periods is presented in Fig. 34 (a ,b, c & d) and Table 11.

Figure: 34(a)

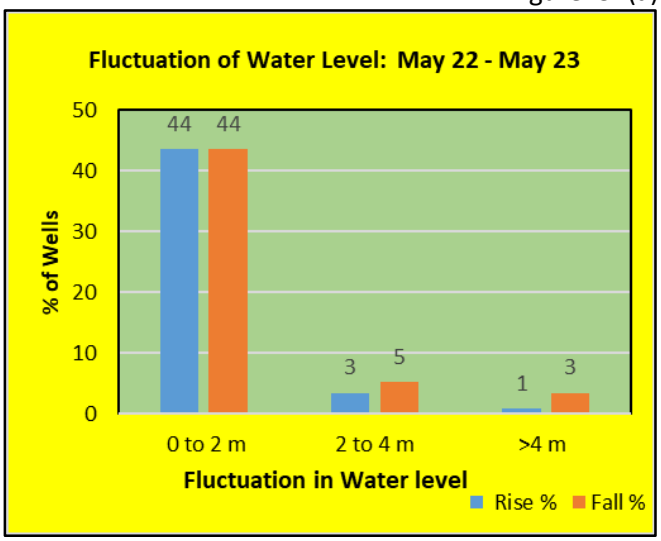


Figure: 34(b)

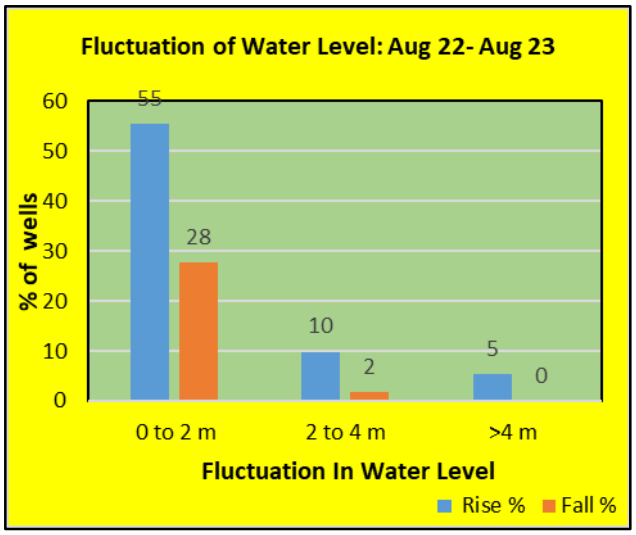


Figure: 34(c)

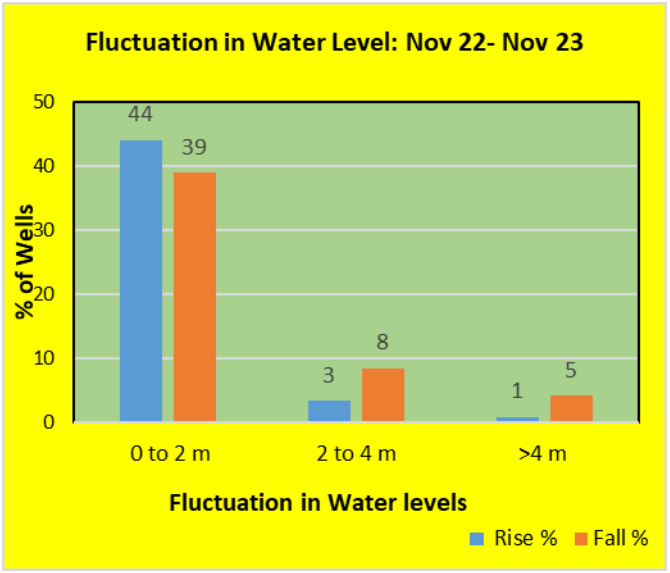


Figure: 34(d)

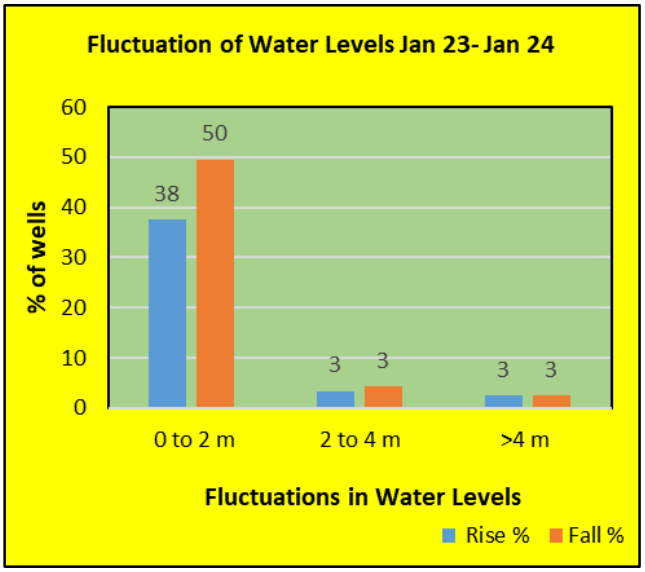


Table: 11 Monitoring wells showing Annual Fluctuation in Ground Water Level

WATER LEVEL FLUCTUATION	MAY 22 - MAY 23		AUG 22 - AUG 23		NOV 22 - NOV 23		JAN 23 - JAN 24	
	Rise	Fall	Rise	Fall	Rise	Fall	Rise	Fall
0 to 2 m	51	51	62	31	52	46	44	58
>2 to 4 m	4	6	11	2	4	10	4	5
>4 m	1	4	6	0	1	5	3	3
Total	**56**	**61**	**79**	**33**	**57**	**61**	**51**	**66**
	117		112		118		117	

4.3.1. Annual Fluctuation: May 2022 & May 2023

The fluctuation of water level between **May-2022** and **May-2023** of NCT Delhi shows that some part of New Delhi district and South district show a considerable rise of >4 m and rise >2-4m in water level whereas most of the state show water level rise between 0 m to 2m. Northeastern part of the state shows mostly fall in water level between 0 m to 2m. Nearly 42 % of area of NCT Delhi shows rise in water level while 58 % of area shows fall in water level (Fig. 35) (Fig. 36). Out of all monitoring stations 52 % shows fall in water level whereas 48 % show rise in water level (Figure: 34(a)).

Fig.35

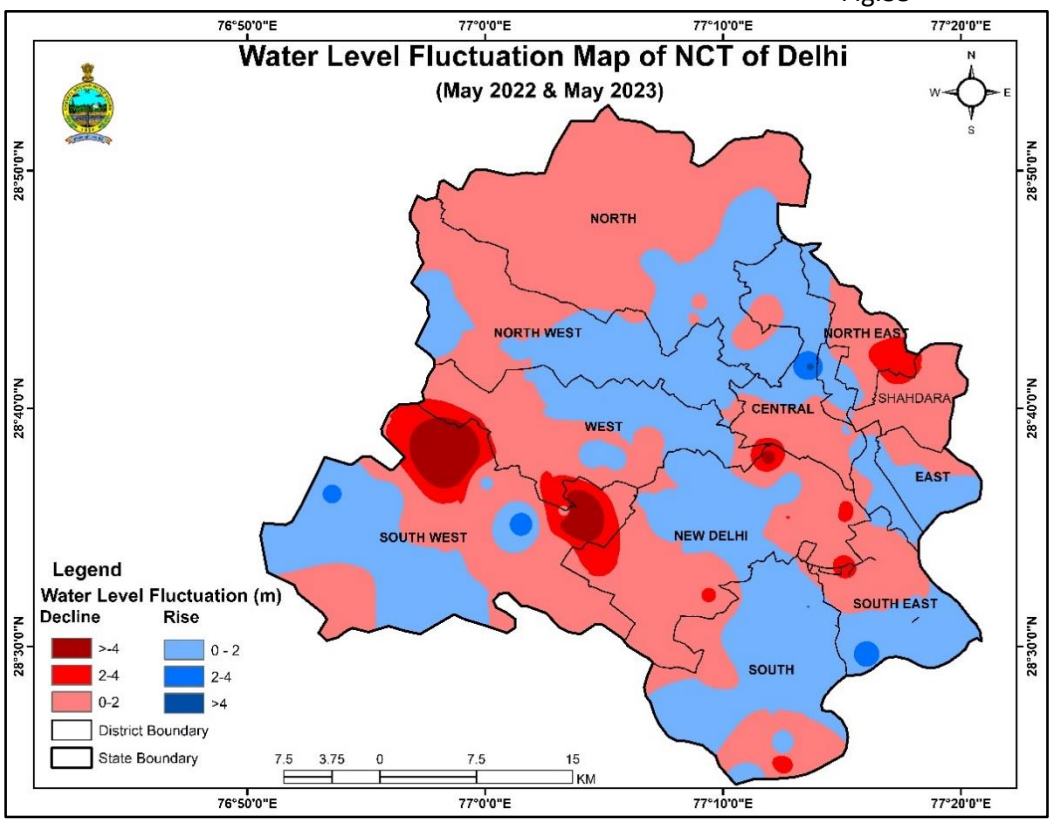
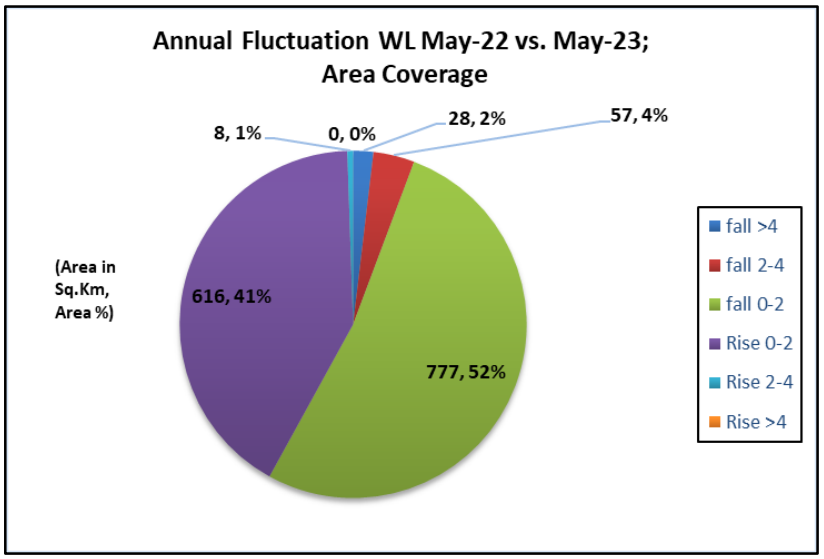


Fig.36



4.3.2. Annual Fluctuation: August 2022 & August 2023

The variation of water level between August-2022 and August-2023 reveals that 88 % of area in NCT Delhi shows rise rest 12 % of area shows fall (Fig. 37 & chart Fig. 38). Out of all monitoring stations 70% of wells shows rise in water level whereas 30 % of wells shows fall in water level (Fig. 34(b)).

Fig. 37

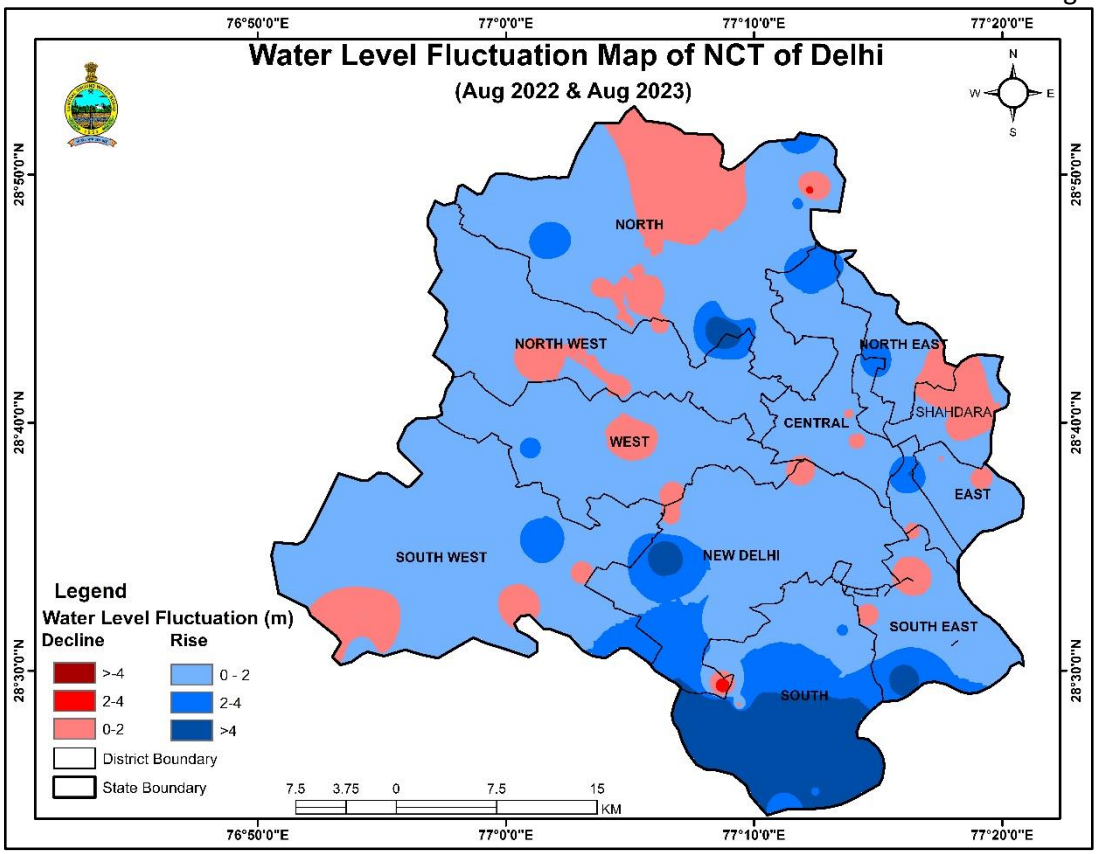
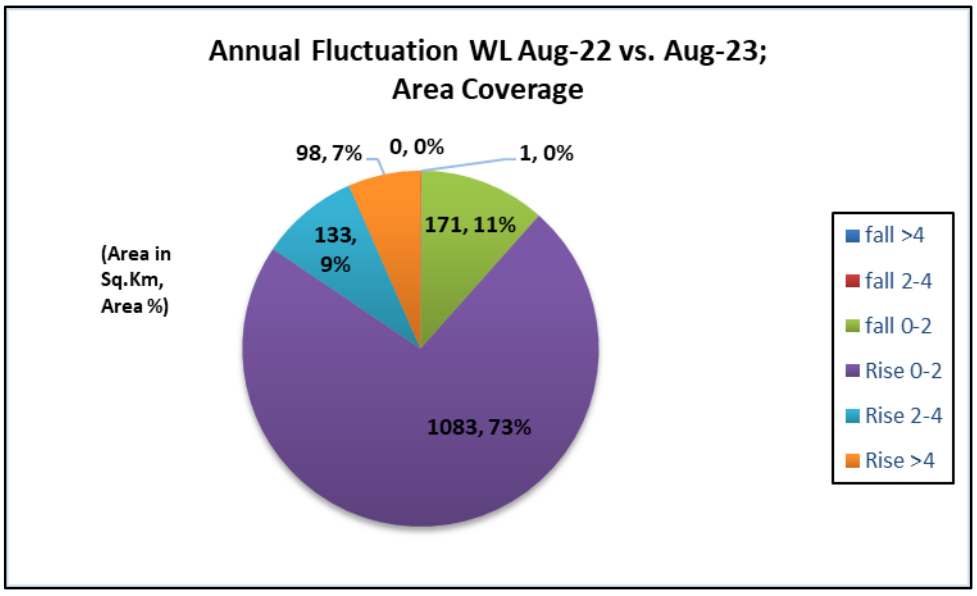


Fig. 38



4.3.3. Annual Fluctuation: November 2022 & November 2023

Comparing water level data of November 2022 to November 2023, it is revealed that 48 % of monitoring stations show rise in water level. Rest 52 % of monitoring stations shows fall in water level.(Fig. 34(c)). Nearly 36 % of NCT Delhi areas show rise while 64 % of area shows fall (Fig. 39 &Fig. 40).

Fig.39

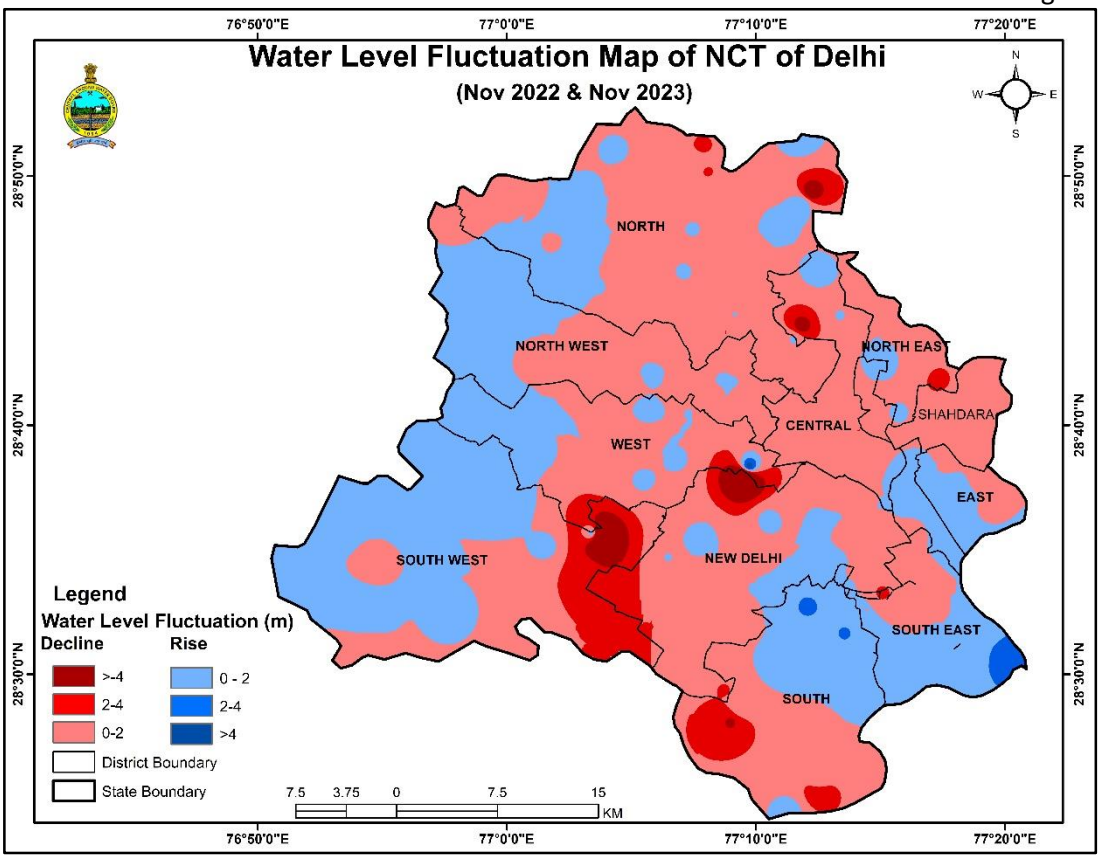
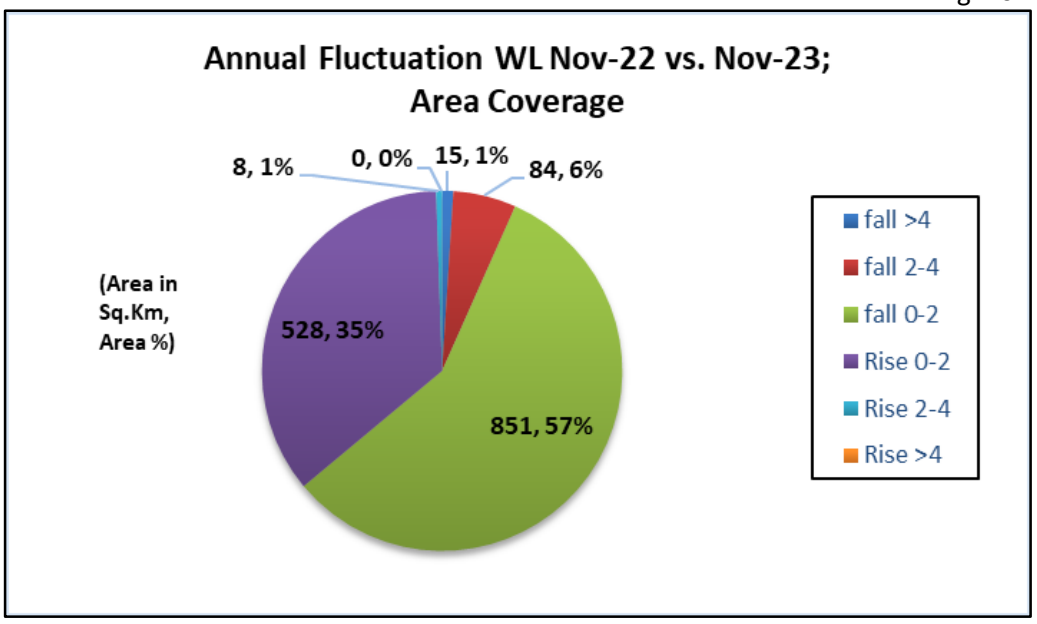


Fig. 40



4.3.4. Annual Fluctuation: January 2023 & January 2024

Comparing water level data of January 2023 to January 2024, it is revealed that 44 % monitoring stations shows rise whereas rest 56 % of monitoring stations show fall (Fig. 34(d)). Nearly 42 % of areas show rise and around 58 % of area shows fall (Fig. 41) & (Fig. 42).

Fig. 41

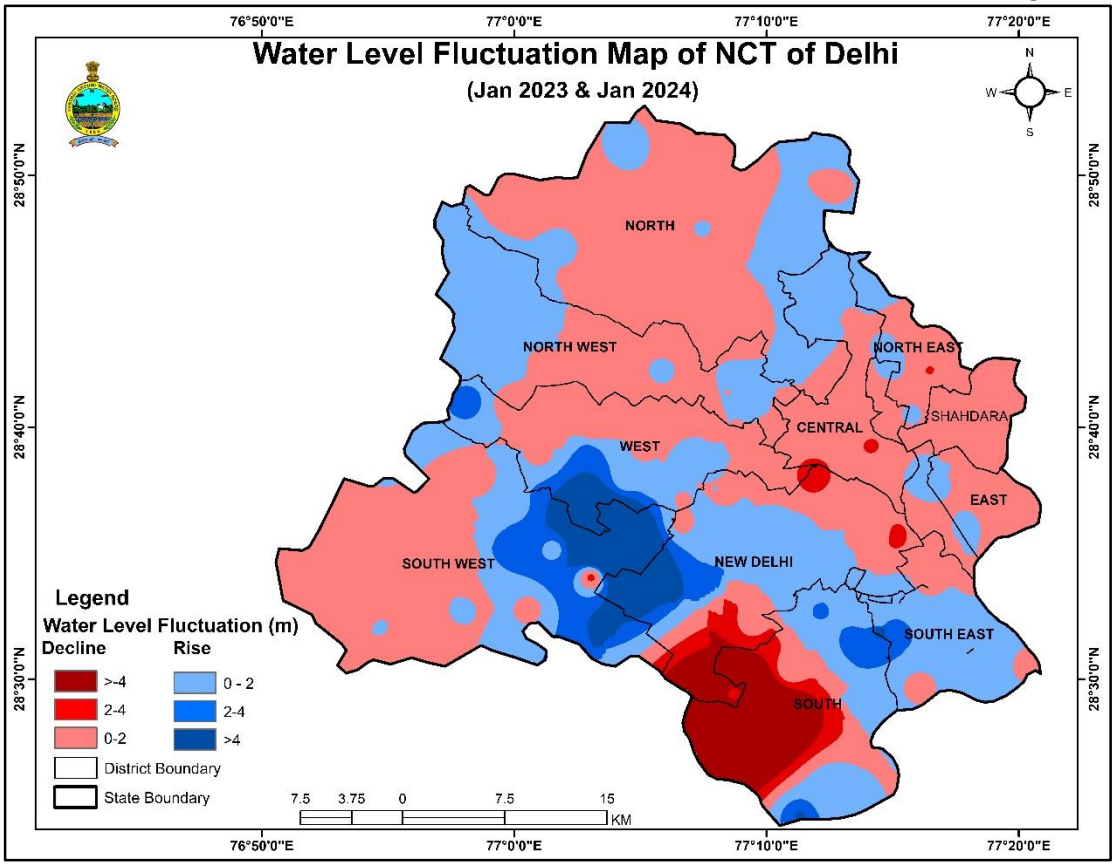
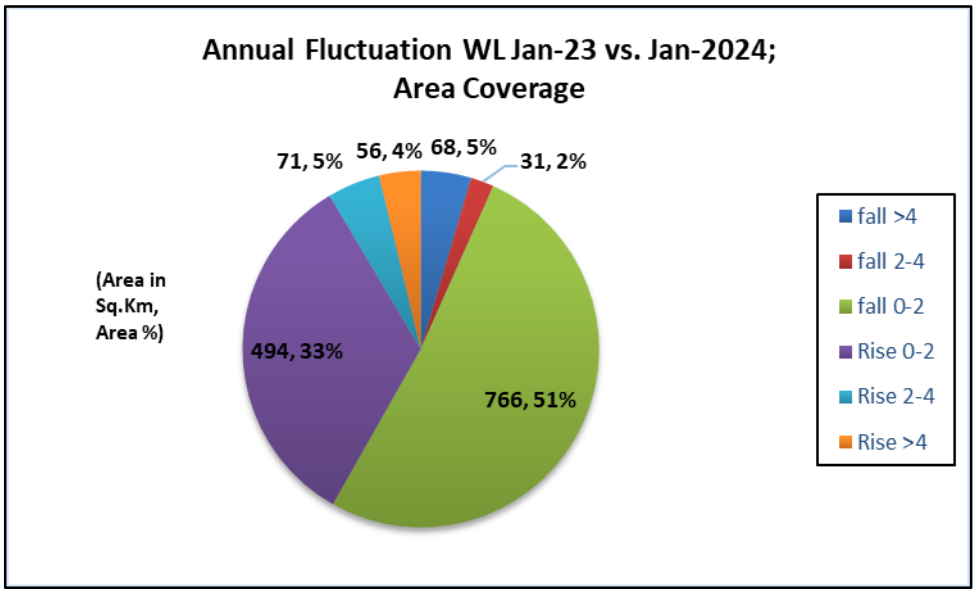


Fig. 42



4.4 Long Term Ground Water Scenario

Long-term behavior of water levels was studied by analyzing water level change of decadal mean water levels data of 2013-22 for May, August & November and 2014-23 decade for January month with corresponding water level data of 2023-24. Statistical analysis of numbers of monitoring wells and range of water levels showing decadal change is presented as charts in Fig. 43 (a, b, c & d) and in Table 12. The decadal water level mean data and fluctuation data is given in Annexure III (B) and Annexure V(A), V(B) respectively.

Fig.43(a)

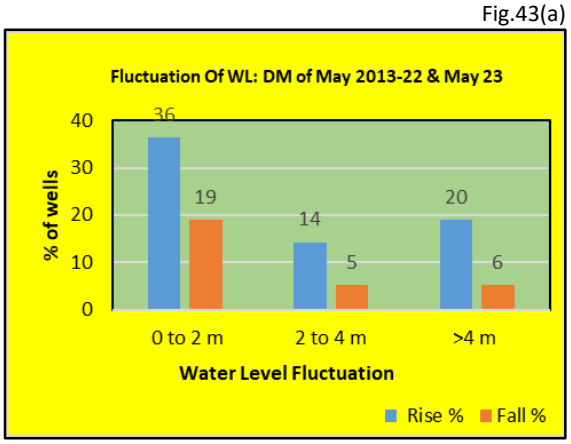


Fig.43(b)

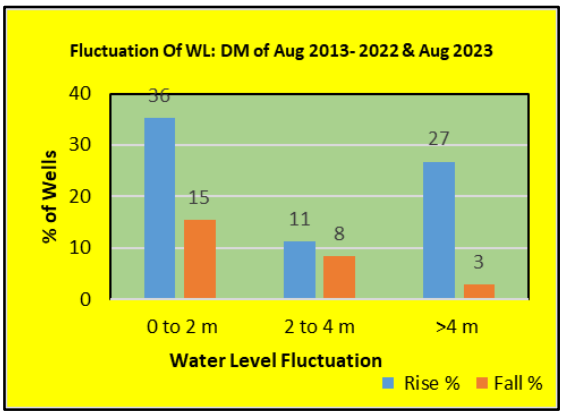


Fig.43(C)

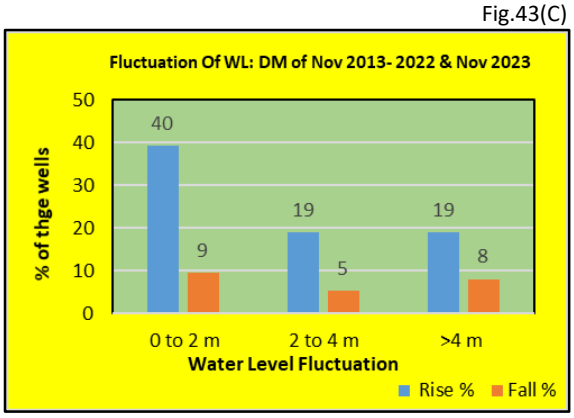


Fig.43(b)

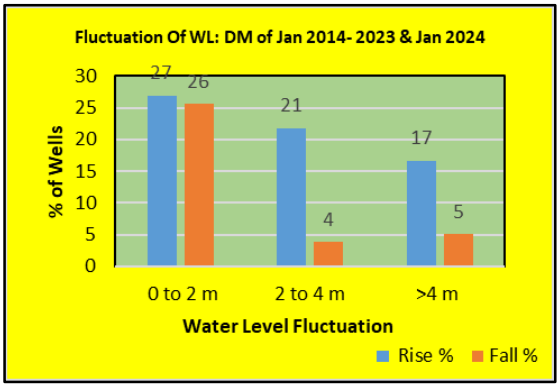


Table: 12 Monitoring wells showing change in water levels comparing with decadal mean

Water level Fluctuation Range	DM of May 2013 -2022 & May 2023		DM of Aug 2013 -2022 & Aug 2023		DM of Nov 2013 -2022 & Nov 2023		DM of Jan 2014 -2023 & Jan 2024	
	Rise	Fall	Rise	Fall	Rise	Fall	Rise	Fall
0 to 2 m	28	15	25	11	29	7	21	20
2 to 4 m	11	4	8	6	14	4	17	3
>4 m	15	4	19	2	14	6	13	4
Total	54	23	52	19	57	17	51	27
	77		71		74		78	

Maps showing change in water level scenario over May, August, November and January for year 2023-24 with decadal mean of May, August & November for 2013-22 and January 2014-23 respectively are presented in figure 44, 46, 48 and 50 and pie diagrams showing areas under different ranges of water level change are presented in Fig. 45, 47, 49 and 51 respectively for month corresponding May, August, November and January of 2023-24.

4.4.1. Decadal Fluctuation: (DM of May 2013-22 & May 2023)

Comparing water level data of May-2023 with 10 year mean water level of May (2013 to 2022), the change in water level ranges from -13.66 m to 17.70 m. Nearly 30 % of monitoring wells show fall in water level of May 2023 when comparing decadal mean of May water level of 2013-22, whereas rest 70 % wells show rise in water levels (Fig. 43a). The rise mainly confined to South-West, West, New Delhi, Central, South and South East (Fig. 44). Chart showing extent of areas having change in rise and fall, computed from map grid, is presented in Fig. 44 & 45.

Fig. 44

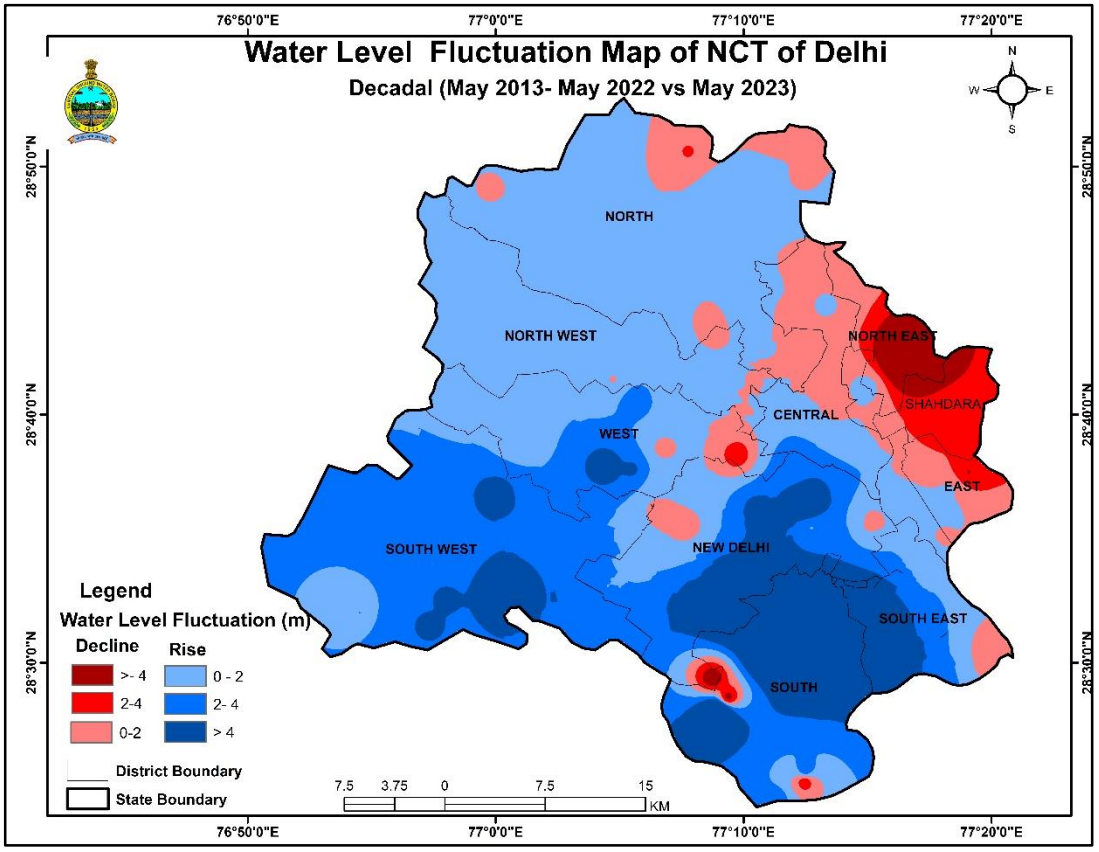
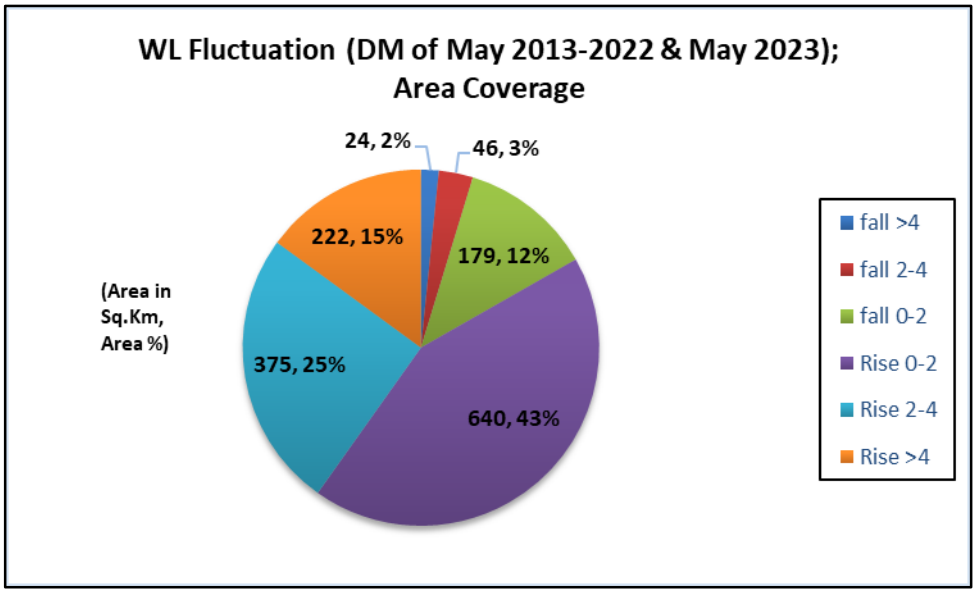


Fig. 45



4.4.2. Decadal Fluctuation: (DM of August 2013-22 & August 2023)

Comparing water level data of August-2023 with 10 year mean water level of August (2013 to 2022), the change in water ranges from –6.76 m to 38.11 m. Nearly 74% of monitoring wells show rise in water level of August 2023, comparing decadal mean of August water level of 2013-22, whereas rest 26 % monitoring wells show fall in water level(fig. 43b). Chart showing extent of areas having change in rise and fall, computed from map grid is presented in Fig. 47.

Fig. 46

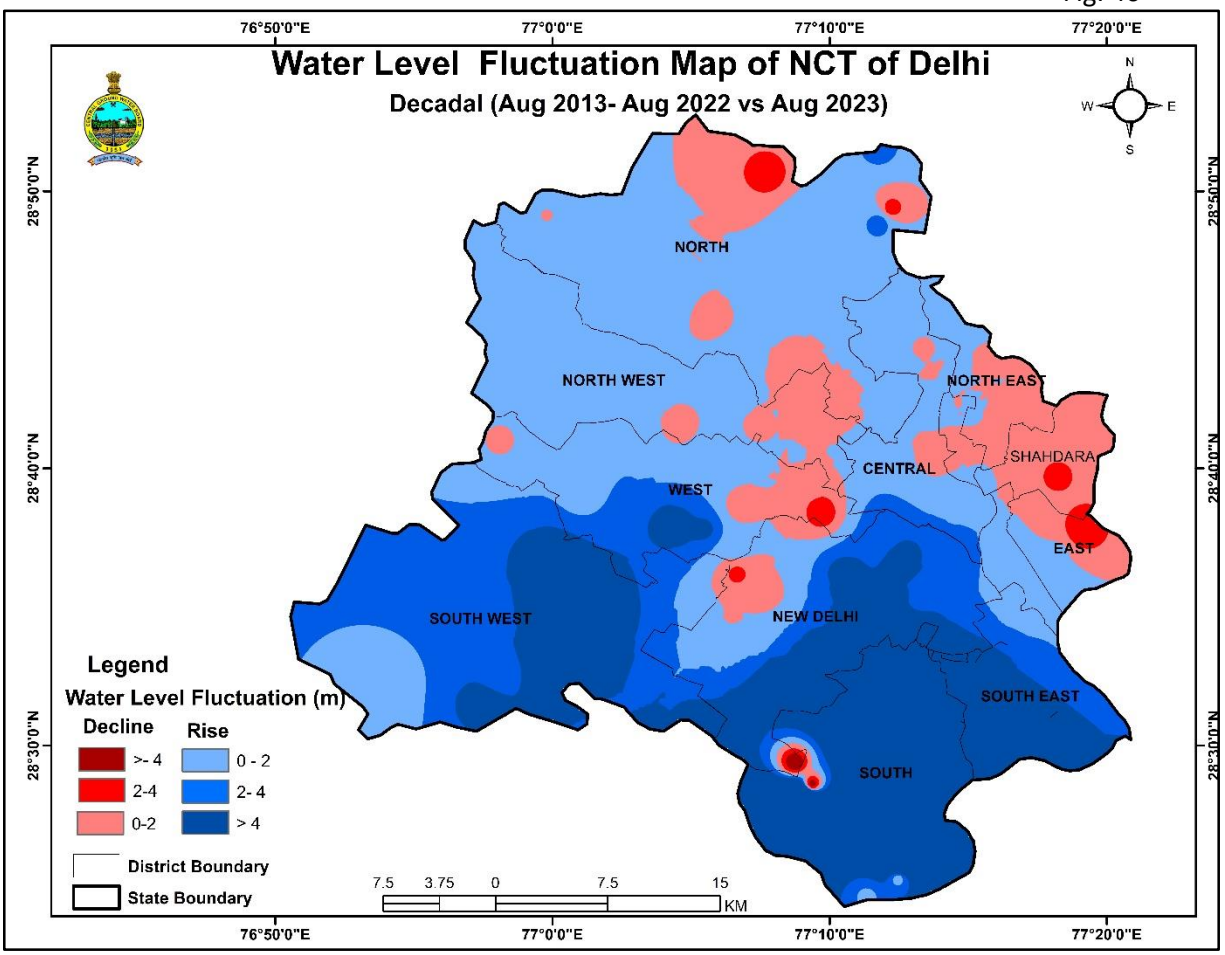
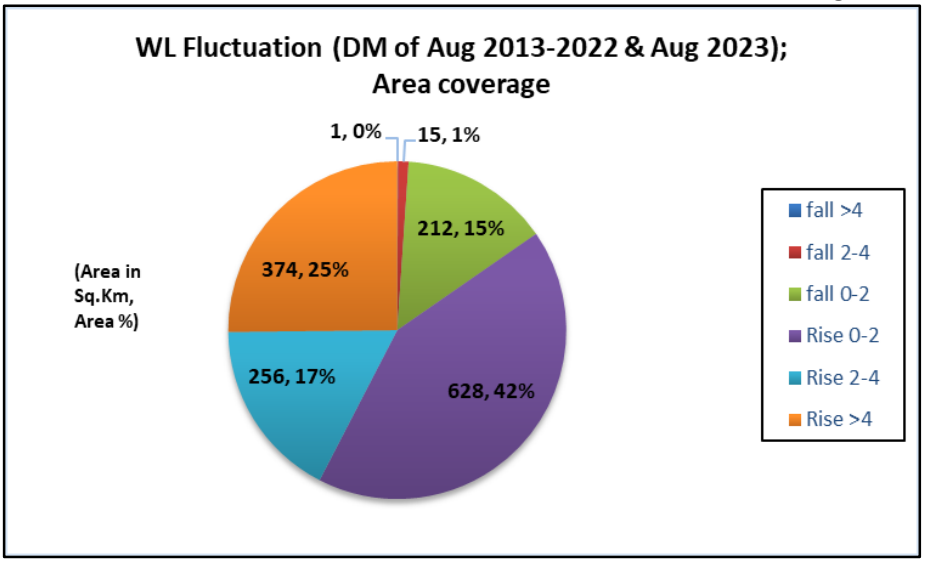


Fig. 47



4.4.3. Decadal Fluctuation: DM of Nov 2013-22 & Nov 2023

Comparing water level data of November-2023 with 10 year mean water level of November (2013 to 2022), the change in water level ranges from -17.79 m to 16.97 m. Nearly 78 % of monitoring wells show in rise of water level of November 2023, comparing decadal mean of November water level of 2013-22, whereas rest 22 % monitoring wells show fall of water level (Fig. 43c). Chart showing extent of areas having change in rise and fall, computed from map grid is presented in Fig. 49.

Fig. 48

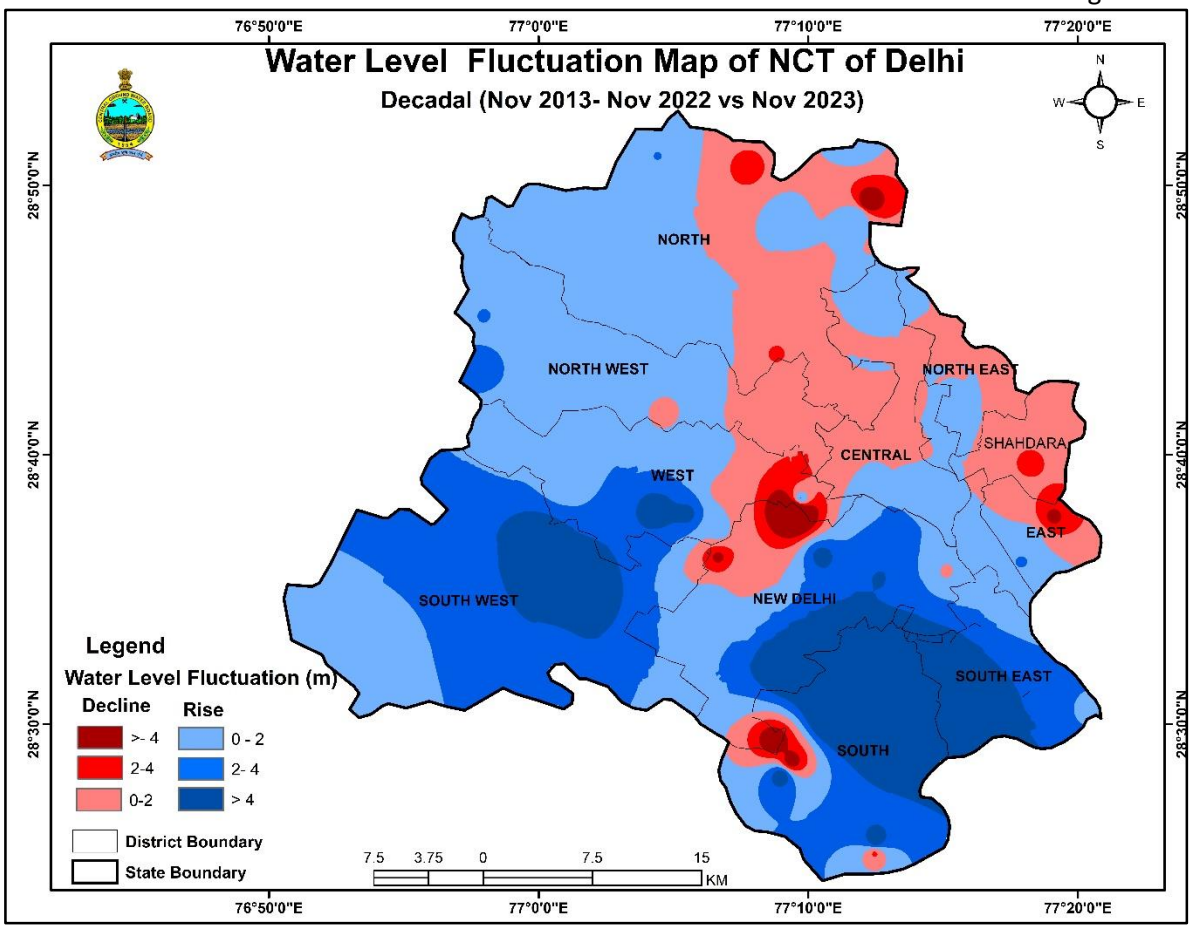
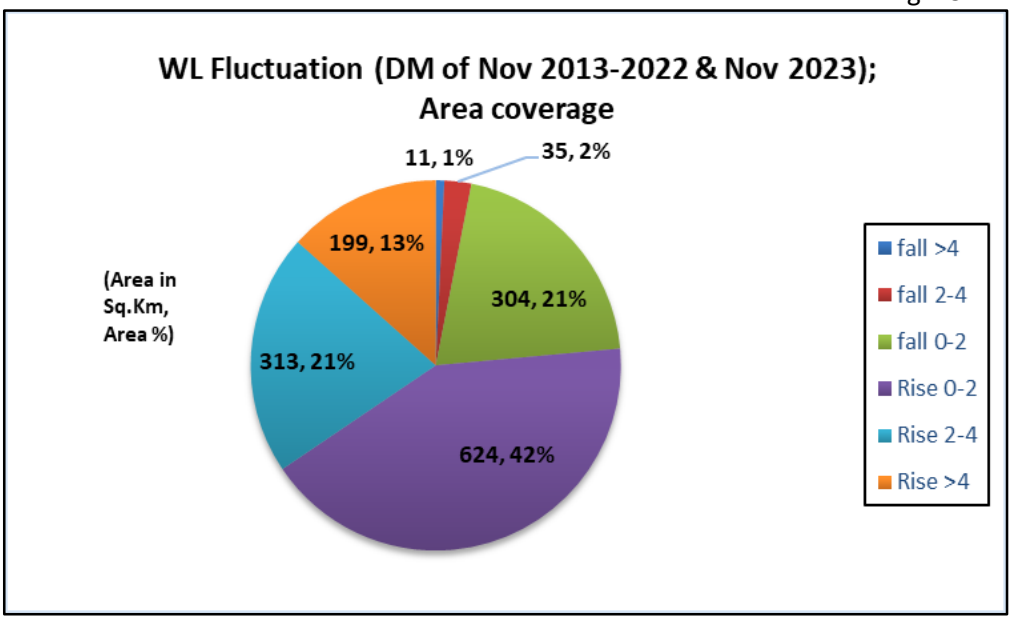


Fig. 49



4.4.4. Decadal Fluctuation: DM of January 2014–23 & January 2024

Comparing water level data of January-2024 with 10 year mean water level of January (2014 to 2023), the change in water level ranges from -18.27 m to 16.45 m. Nearly 65 % of monitoring wells show rise whereas rest 35 % monitoring wells shows fall (Fig. 43d). Chart showing extent of areas having change in rise and fall, computed from map grid, is presented in Fig. 51.

Fig. 50

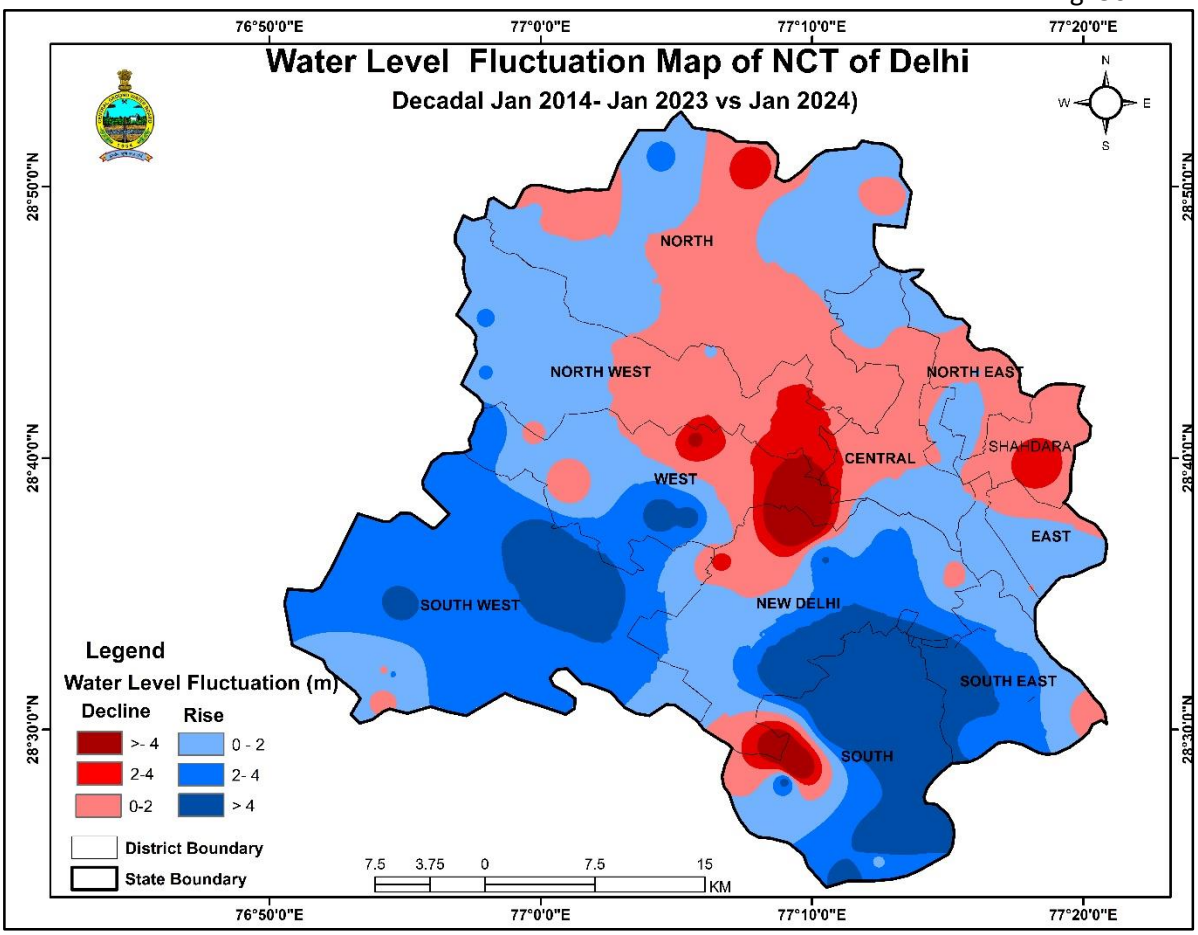
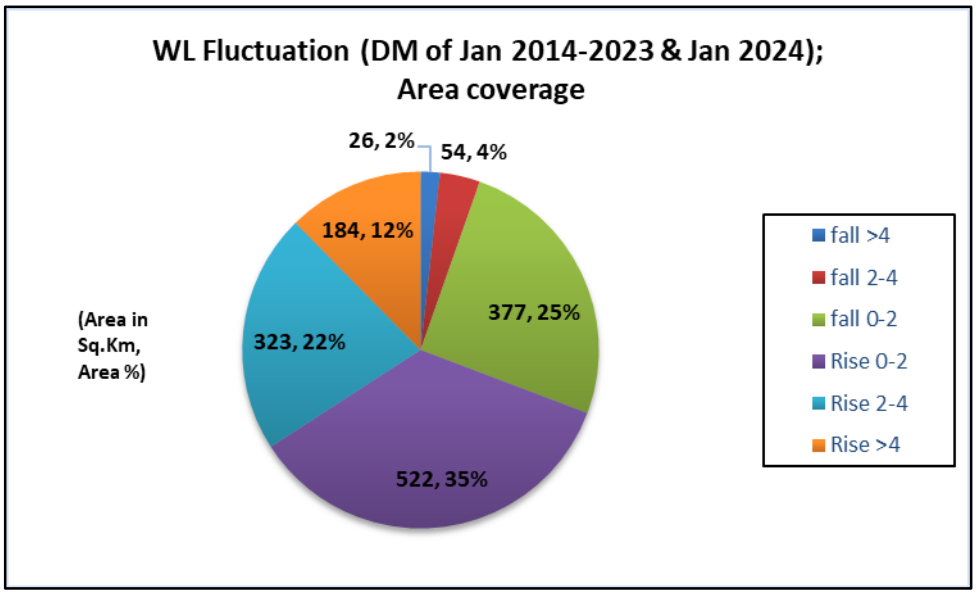


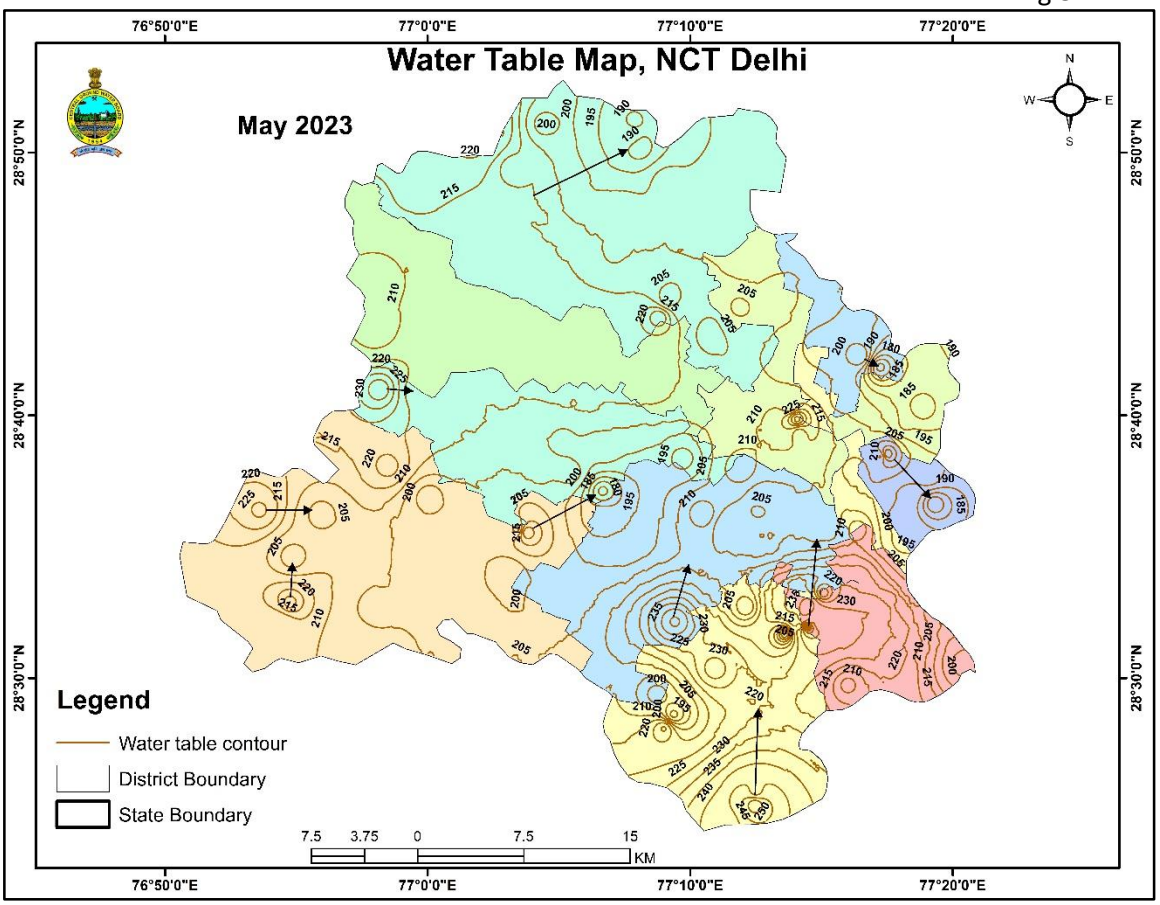
Fig. 51



4.5 Water Table Scenario

Water table contour map of May 2023 is presented in Fig. 52. The perusal of the map shows that the water table elevation ranges from 168 m amsl at Yamuna Vihar DJB WTP in Yamuna Vihar to 261 m amsl at DJB Overhead Tank GK-II Pz in kalkaji tehsil of NCT Delhi. Aravalli Ridge areas is main recharge zones for NCT Delhi. In these areas water table ranges from 195 to 235 m amsl. Closely spaced contours on the eastern side of the ridge indicate steep gradient and high rate of flow of ground water, while widely spaced contours on the western side of the ridge indicate gentle gradient. Some troughs of lowest water table observed in NCT Delhi, indicate high development of groundwater. In remain part of NCT Delhi, water table contour follows general topography of the areas. Yamuna river flood zone shows water table in range of 185 to 210 m amsl. Major parts of Yamuna flood zone in NCT of Delhi, on either bank, water table configuration indicate influent nature of river Yamuna while in small section passing through South East district it shows effluent nature on right bank, however left bank area, bordering Uttar Pradesh it shows influent nature.

Fig.52



5. Water Levels in Deeper Aquifers in NCT, Delhi

5.1 Depth to Water Level

In NCT of Delhi, five no. of monitoring wells are used to monitor deep aquifer systems for all four monitoring periods of year 2023-24 (May, August, November & January,) (Annexure-IIIA). The monitoring wells are namely 1) Bakoli Deep Pz 2) Lodhi Garden Deep 3) Tiggipur Deep 4) Shikarpur Deep 5) CVD Depot Cant (deep).

5.1.1 May 2023

The depth to water level of deeper aquifers in NCT Delhi during May-2023 was 9.9 m bgl at Bakoli Deep Pz, 7.81 m bgl at Tiggipur deep, 7.56 m bgl at Lodhi Garden Deep, 25.76 m bgl at CVD Depot Cantt. Deep and 6.1 m bgl at Shikarpur Deep.

5.1.2 August 2023

The depth to water level of deeper aquifers in NCT Delhi during August-2023 was 10.6 m bgl at Bakoli Deep Pz, 5.57 m bgl at Tiggipur deep, 3.45 mbgl at Lodhi Garden Deep, 27 m bgl at CVD Depot Cantt. Deep and 6.35 m bgl at Shikarpur Deep.

5.1.3 November 2023

The depth to water level of deeper aquifers in NCT Delhi during November-2023 was 10.05 m bgl at Bakoli Deep Pz, 6.49 m bgl at Tiggipur deep, 3.93 m bgl at Lodhi Garden Deep, and 27.87 m bgl at CVD Depot Cant (Deep).

5.1.4 January 2024

The depth to water level of deeper aquifers in NCT Delhi during January-2024 was 10 m bgl at Bakoli Deep Pz, 6.82 m bgl at Tiggipur deep, 3.63 m bgl at Lodhi Garden Deep, 6.83 m bgl at Shikarpur Deep and 27.82 m bgl at CVD Depot Cant (Deep).

5.2 Seasonal Water Level Fluctuation: 2023-24

The seasonal water level fluctuation, i.e. the changes in depth of water levels of August 23, November 23 and January 24 with respect to May 23 water level reveals the effect of subsequent utilization of groundwater for various needs like Industrial, Irrigation, Domestic etc., on overall groundwater regime of the area.

5.2.1 May 2023 to August 2023

The water level fluctuation between May-2023 and August-2023 shows fall of 0.7 m at Bakoli Deep Pz, 1.24 m at CVD Depot Cantt. Deep, 0.25 m at Shikarpur Deep. And a rise of 1.11 m at Lodhi Garden Deep, 2.24 m at Tiggipur Deep. The analysis for these monitoring stations for all the four monitoring periods reveals that water level varies considerably.

5.2.2 May 2023 to November 2023

The water level fluctuation between May-2023 and Nov-2023 shows fall of 0.15 m at Bakoli Deep Pz, 2.11 m at CVD Depot Cantt. Deep and a rise of 0.63 m at Lodhi Garden Deep, 1.32 m at Tiggipur Deep. The analysis for these monitoring stations for all the four monitoring periods reveals that water level varies considerably.

5.2.3 May 2023 to January 2024

The water level fluctuation between May-2023 and Jan-2024 shows fall of 0.1 m at Bakoli Deep Pz, 0.73 m at Shikarpur Deep, 2.06 m at CVD Depot Cantt. Deep and a rise of 0.93 m at Lodhi Garden Deep, rise of 0.99 m at Tiggipur Deep. The analysis for these monitoring stations for all the four monitoring periods reveals that water level varies considerably.

5.3 Annual Water Level Fluctuation: 2022-23

Annual Fluctuation in the water levels of the ground water monitoring wells during 2022-23 for different monitoring periods were compared with same period of 2021-22 and wells showing change in groundwater levels over different periods.

5.3.1 Annual Fluctuation: May 2022 & May 2023

The water level fluctuation between May-2022 and May-2023 shows a rise of 0.11 m at Lodhi Garden Deep, 1.33 m at Shikarpur Deep, 0.18 m at CVD Depot Deep and 0.6 m at Tiggipur Deep. And a fall of 1.11 m at Bakoli Deep Pz. The analysis for these monitoring stations for all the four monitoring periods reveals that water level varies considerably.

5.3.2 Annual Fluctuation: August 2022 & August 2023

The water level fluctuation between August-2022 and August-2022 shows rise 3.48 m at Tiggipur Deep, 1.01 m at Shikarpur Deep, 1.25 m at Lodhi Garden Deep and a fall of 0.43 m at Bakoli Deep Pz, and 0.56 m at CVD Depot Deep. The analysis for these monitoring stations for all the four monitoring periods reveals that water level varies considerably.

5.3.3 Annual Fluctuation: November 2022 & November 2023

The water level fluctuation between November-2022 and November-2023 shows fall of 1 m at Bakoli Deep Pz, 0.02 m at Lodhi Garden Deep, 1.57 m at CVD Depot Deep and a rise of 2.13 m at Tiggipur Deep. The analysis for these monitoring stations for all the four monitoring periods reveals that water level varies considerably.

5.3.4 Annual Fluctuation: January 2023 & January 2024

The water level fluctuation between January-2023 and January-2024 shows fall of 0.74 m at Bakoli Deep Pz, 1.28 m at CVD Depot Cantt. Deep, 0.6 m at Shikarpur Deep and a rise of 0.19 m at Lodhi Garden Deep and 0.67 m at Tiggipur Deep. The analysis for these monitoring stations for all the four monitoring periods reveals that water level varies considerably.

5.4 Long Term Ground Water Scenario

Long-term behavior of water levels was studied by analyzing water level change of decadal mean water levels data of 2012-21 for May, August & November and 2013-22 decade for January month with corresponding water level data of 2022-23 (Annexure-IIIB).

5.4.1 Decadal Fluctuation: (DM of May-2013-22 & May 2023)

Comparing water level data of May-2023 with 10-year mean water level of May (2013 to 2022) shows rise of 3.18 m at Lodhi Garden Deep, 4.10 m at Shikarpur Deep, of 1.14 m at Bakoli Deep and 1.52 m at Tiggipur Deep, fall of 1.16 m at CVD Depot Cantt. Deep.

5.4.2 Decadal Fluctuation: (DM of Aug-2013-22 & Aug-2023)

Comparing water level data of August-2023 with 10 year mean water level of August (2013 to 2022) shows rise of 3.71 m at Lodhi Garden Deep, 4.35 m at Shikarpur Deep, 1.89 m at Bakoli Deep, 4.17 m at Tiggipur Deep and fall of 2.84 m at CVD Depot Cant.

5.4.3 Decadal Fluctuation: (DM of Nov-2013-22 & Nov- 2023)

Comparing water level data of November-2023 with 10 year mean water level of November (2013 to 2022) shows rise of 3.12 m at Lodhi Garden Deep, 0.77 m at Bakoli Deep, 2.44 m at Tiggipur Deep and fall of 4.62 m at CVD Depot Cant.

5.4.4 Decadal Fluctuation: (DM of January-2014-23 & January- 2024)

Comparing water level data of January-2024 with 10 year mean water level of January (2014 to 2023) shows rise of 3.17 m at Lodhi Garden Deep, 2.62 m at Shikarpur Deep, 0.62 m at Bakoli Deep,

1.89 m at Tiggipur Deep and fall of 2.97 m at CVD Depot Cant.

ANNEXURE IA: LIST OF CENSUS TOWNS – NCT OF DELHI

District	Tehsil	Town Name Name
CENTRAL	Civil Lines	Burari (CT)
CENTRAL	Civil Lines	JharodaMajraBurari (CT)
CENTRAL	Civil Lines	Kamal PurMajraBurari (CT)
CENTRAL	Civil Lines	Mukund Pur (CT)
EAST	Gandhi Nagar	ShakarPurBaramad (CT)
EAST	Mayur Vihar	ChillaSarodaBangar (CT)
EAST	Mayur Vihar	ChillaSaroda Khadar (CT)
EAST	Mayur Vihar	Dallo Pura (CT)
EAST	Mayur Vihar	Gharoli (CT)
EAST	Mayur Vihar	GharondaNeemkaBangar alias Patpar Ganj (CT)
EAST	Mayur Vihar	Kondli (CT)
NEW DELHI	Delhi Cantonment	Moradabad Pahari (CT)
NEW DELHI	VasanatVihar	Ghitorni (CT)
NEW DELHI	VasanatVihar	Kusum Pur (CT)
NEW DELHI	VasanatVihar	Malik PurKohi alias Rang Puri (CT)
NEW DELHI	VasanatVihar	Rajokri (CT)
NEW DELHI	VasanatVihar	Sambhalka (CT)
NORTH	Alipur	Ali Pur (CT)
NORTH	Alipur	Bakhtawar Pur (CT)
NORTH	Alipur	Bankauli (CT)
NORTH	Alipur	Ibrahim Pur (CT)
NORTH	Alipur	Khera Kalan (CT)
NORTH	Alipur	LibasPur (CT)
NORTH	Alipur	MukhmelPur (CT)
NORTH	Alipur	Qadi Pur (CT)
NORTH	Alipur	Sahibabad DaulatPur (CT)
NORTH	Alipur	SirasPur (CT)
NORTH	Model Town	Bhalswa Jahangir Pur (CT)
NORTH	Narela	Bankaner (CT)
NORTH	Narela	Barwala (CT)
NORTH	Narela	Bawana (CT)
NORTH	Narela	BhorGarh (CT)
NORTH	Narela	Darya Pur Kalan (CT)
NORTH	Narela	Khera Khurd (CT)
NORTH	Narela	PehladPurBangar (CT)
NORTH	Narela	POOTH KHURD
NORTH	Narela	Tikri Khurd (CT)
NORTH EAST	Karwal Nagar	Baqiabad (CT)
NORTH EAST	Karwal Nagar	JiwanPur alias Johri Pur (CT)
NORTH EAST	Karwal Nagar	Karawal Nagar (CT)
NORTH EAST	Karwal Nagar	Sadat PurGujran (CT)
NORTH EAST	SeelamPur	DayalPur (CT)
NORTH EAST	SeelamPur	Khajoori Khas (CT)
NORTH EAST	SeelamPur	Khan PurDhani (CT)
NORTH EAST	SeelamPur	Mir Pur Turk (CT)
NORTH EAST	SeelamPur	TukhmirPur (CT)
NORTH EAST	Yamuna Vihar	GokalPur (CT)
NORTH EAST	Yamuna Vihar	Mustafabad (CT)
NORTH EAST	Yamuna Vihar	Ziauddin Pur (CT)
NORTH WEST	Kanjhawala	Gheora (CT)
NORTH WEST	Kanjhawala	Kanjhawala (CT)
NORTH WEST	Kanjhawala	Karala (CT)
NORTH WEST	Kanjhawala	Lad Pur (CT)
NORTH WEST	Kanjhawala	Mohammad PurMajri (CT)
NORTH WEST	Kanjhawala	Qutab Garh (CT)
NORTH WEST	Rohini	Begum Pur (CT)

District	Tehsil	Town Name Name
SHAHDARA	Seema Puri	Mandoli (CT)
SHAHDARA	Shahdara	Babar Pur (CT)
SHAHDARA	Shahdara	Jaffrabad (CT)
SOUTH	Mehrauli	Aya Nagat (CT)
SOUTH	Mehrauli	Chandan Hola (CT)
SOUTH	Mehrauli	Dera Mandi (CT)
SOUTH	Mehrauli	Fateh Pur Beri (CT)
SOUTH	Mehrauli	JonaPur (CT)
SOUTH	Mehrauli	Sultan Pur (CT)
SOUTH	Saket	Asola (CT)
SOUTH	Saket	Bhati (CT)
SOUTH	Saket	ChhatarPur (CT)
SOUTH	Saket	Deoli (CT)
SOUTH	Saket	Maidan Garhi (CT)
SOUTH	Saket	Neb Sarai (CT)
SOUTH	Saket	Raj Pur Khurd (CT)
SOUTH	Saket	SaidulAzaib (CT)
SOUTH	Saket	Tigri (CT)
SOUTH EAST	Defence Colony	Saidabad (CT)
SOUTH EAST	Kalkaji	PulPehlad (CT)
SOUTH EAST	Sarita Vihar	Aali (CT)
SOUTH EAST	Sarita Vihar	Jaitpur (CT)
SOUTH EAST	Sarita Vihar	KotlaMahigiran (CT)
SOUTH EAST	Sarita Vihar	MithePur (CT)
SOUTH EAST	Sarita Vihar	Molar Band (CT)
SOUTH EAST	Sarita Vihar	Taj Pul (CT)
SOUTH WEST	Dwarka	NangliSakrawati (CT)
SOUTH WEST	Kapeshera	Chhawla (CT)
SOUTH WEST	Kapeshera	DindarPur (CT)
SOUTH WEST	Kapeshera	Kapas Hera (CT)
SOUTH WEST	Najafgarh	Jaffar Pur Kalan (CT)
SOUTH WEST	Najafgarh	Jharoda Kalan (CT)
SOUTH WEST	Najafgarh	Kair (CT)
SOUTH WEST	Najafgarh	Khera (CT)
SOUTH WEST	Najafgarh	Mitraon (CT)
SOUTH WEST	Najafgarh	Roshan Pura alias Dichaon Khurd (CT)
SOUTH WEST	Najafgarh	Ujwa (CT)
WEST	Patel Nagar	Hastsal (CT)
WEST	Patel Nagar	Raja Pur Khurd (CT)
WEST	Punjabi Bagh	Bakkar Wala (CT)
WEST	Punjabi Bagh	Bapraula (CT)
WEST	Punjabi Bagh	Mundaka (CT)
WEST	Punjabi Bagh	NangloiJat (CT)
WEST	Punjabi Bagh	Nilothi (CT)
WEST	Punjabi Bagh	Quammruddin Nagar (CT)
WEST	Punjabi Bagh	ShafiPurRanhola (CT)
WEST	Punjabi Bagh	Tikri Kalan (CT)
WEST	Punjabi Bagh	TilangPurKotla (CT)
NORTH WEST	Rohini	Kirari Suleman Nagar (CT)
NORTH WEST	Rohini	Mubarak PurDabas (CT)
NORTH WEST	Rohini	Nithari (CT)
NORTH WEST	Rohini	Pooth Kalan (CT)
NORTH WEST	Rohini	Rani Khera (CT)
NORTH WEST	Rohini	Sultan PurMajra (CT)

ANNEXURE IB: LIST OF VILLAGES – NCT OF DELHI

District	Tehsil	Village Name
CENTRAL	Civil Lines	BadarPurMajraBurari
CENTRAL	Civil Lines	Jagat Purilaqa Delhi
CENTRAL	Civil Lines	Jagat Purilaqa Shahdara (un-inhabited)
CENTRAL	Civil Lines	Salem PurMajraBurari
EAST	Mayur Vihar	ShamasPur
NORTH	Alipur	Akbar PurMajra
NORTH	Alipur	Bodh PurBijaPur
NORTH	Alipur	Fateh PurJat
NORTH	Alipur	GarhiKhasru
NORTH	Alipur	Hamid Pur
NORTH	Alipur	Hiranki
NORTH	Alipur	Jhangola
NORTH	Alipur	Kham Pur
NORTH	Alipur	Mohd. Pur Ramzan Pur
NORTH	Alipur	Nangli Poona
NORTH	Alipur	Palla
NORTH	Alipur	QullakPur
NORTH	Alipur	Singhola
NORTH	Alipur	Singhu
NORTH	Alipur	SungerPur Delhi
NORTH	Alipur	SungerPur Shahdara (un-inhabited)
NORTH	Alipur	Taj Pur Kalan
NORTH	Alipur	Tehri DaulatPur (Un-inhabited)
NORTH	Alipur	TigiPur
NORTH	Alipur	ZindPur
NORTH	Model Town	ShanjarPur(un-inhabited)
NORTH	Narela	BazidPurThakran
NORTH	Narela	Ghoga
NORTH	Narela	Hareoli
NORTH	Narela	Holambi Kalan
NORTH	Narela	Holambi Khurd
NORTH	Narela	Iradat Nagar alias Naya Bans
NORTH	Narela	KankarKhera
NORTH	Narela	Katewara
NORTH	Narela	Kureni
NORTH	Narela	Lam Pur
NORTH	Narela	MamoorPur
NORTH	Narela	MungeshPur
NORTH	Narela	Ochandi
NORTH	Narela	Pansali
NORTH	Narela	Raja Pur Kalan (Un-inhabited)
NORTH	Narela	Sanoth
NORTH	Narela	Shah PurGarhi
NORTH	Narela	Sultan PurDabas
NORTH EAST	Karwal Nagar	BadarPur Khadar
NORTH EAST	Karwal Nagar	Bihari Pur
NORTH EAST	Karwal Nagar	Pur Delhi
NORTH EAST	Karwal Nagar	Pur Shahdara
NORTH EAST	Karwal Nagar	Saba Pur Delhi
NORTH EAST	Karwal Nagar	Saba Pur Shahdara
NORTH EAST	Karwal Nagar	Sadat PurMusalmanan (un-inhabited)
NORTH EAST	SeelamPur	GarhiMendu
NORTH EAST	SeelamPur	Sher Pur
NORTH WEST	Kanjhawala	BudhanPur
NORTH WEST	Kanjhawala	Chand Pur
NORTH WEST	Kanjhawala	Chatesar
NORTH WEST	Kanjhawala	GarhiRindhala
NORTH WEST	Kanjhawala	Jat Khor
NORTH WEST	Kanjhawala	Jonti
NORTH WEST	Kanjhawala	Nizam Pur Rashid Pur
NORTH WEST	Kanjhawala	Punjab Khor
NORTH WEST	Kanjhawala	Salah PurMajra
NORTH WEST	Rohini	Madan PurDabas
NORTH WEST	Rohini	Rasool Pur
NORTH WEST	SaraswatiVihar	Saoda
SOUTH	Mehrauli	GadaiPur
SOUTH	Saket	Satberi
SOUTH	Saket	ShahurPur
SOUTH WEST	Kapeshera	AsalatPurKhawad
SOUTH WEST	Kapeshera	Badhosra
SOUTH WEST	Kapeshera	Darya Pur Khurd
SOUTH WEST	Kapeshera	DaulatPur
SOUTH WEST	Kapeshera	Deorala
SOUTH WEST	Kapeshera	Goela Khurd
SOUTH WEST	Kapeshera	Goman Hera
SOUTH WEST	Kapeshera	Hasan Pur
SOUTH WEST	Kapeshera	Jain Pur(Un-inhabited)
SOUTH WEST	Kapeshera	Jhatikra
SOUTH WEST	Kapeshera	KanganHeri
SOUTH WEST	Kapeshera	KharkhariJatmal
SOUTH WEST	Kapeshera	KharkhariRond
SOUTH WEST	Kapeshera	Nanak Heri
SOUTH WEST	Kapeshera	Paprawat
SOUTH WEST	Kapeshera	Pindwala Kalan
SOUTH WEST	Kapeshera	Pindwala Khurd
SOUTH WEST	Kapeshera	Qutab Pur
SOUTH WEST	Kapeshera	Raghu Pur
SOUTH WEST	Kapeshera	Raota
SOUTH WEST	Kapeshera	Rewla Kham Pur
SOUTH WEST	Kapeshera	Salah Pur
SOUTH WEST	Kapeshera	Shikar Pur
SOUTH WEST	Kapeshera	Taj Pur Khurd
SOUTH WEST	Najafgarh	BaqarGarh
SOUTH WEST	Najafgarh	Dhansa
SOUTH WEST	Najafgarh	Dichaon Kalan
SOUTH WEST	Najafgarh	Ghalib Pur
SOUTH WEST	Najafgarh	Isa Pur
SOUTH WEST	Najafgarh	Jhuljhuli
SOUTH WEST	Najafgarh	Kharkhari Nahar
SOUTH WEST	Najafgarh	KheraDabar
SOUTH WEST	Najafgarh	Malik Purzer-Najafgarh
SOUTH WEST	Najafgarh	Mundhela Kalan
SOUTH WEST	Najafgarh	Mundhela Khurd
SOUTH WEST	Najafgarh	Qazi Pur
SOUTH WEST	Najafgarh	SamasPur Khalsa
SOUTH WEST	Najafgarh	Sarang Pur
SOUTH WEST	Najafgarh	Sher Pur Deri
SOUTH WEST	Najafgarh	SurakhPur
SOUTH WEST	Najafgarh	Surera
WEST	Punjabi Bagh	Jaffar Pur alias HiranKudna
WEST	Punjabi Bagh	Neel Wal

ANNEXURE II: RAINFALL DATA & PROBABILITY ANALYSIS

Rainfall, Departure and Cumulative Departure & Occurrence of Drought - NCT of Delhi				
Year	Rainfall (mm)	Departure	Cumulative Departure	Type of Drought
1984	579.2	-0.13	-0.13	Mild
1985	771.6	0.16	0.03	
1986	446.4	-0.33	-0.30	Normal
1987	434.2	-0.35	-0.64	Normal
1988	1025.2	0.54	-0.10	
1989	303.6	-0.54	-0.64	Severe
1990	800.6	0.20	-0.44	
1991	614.7	-0.07	-0.51	Mild
1992	641.6	-0.03	-0.55	Mild
1993	861.4	0.30	-0.25	
1994	784.6	0.18	-0.07	
1995	827.6	0.25	0.18	
1996	974.6	0.47	0.64	
1997	617.4	-0.07	0.57	Mild
1998	853.3	0.28	0.86	
1999	544.2	-0.18	0.68	Mild
2000	808	0.22	0.89	
2001	646.2	-0.03	0.86	Mild
2002	459.5	-0.31	0.56	Normal
2003	925.9	0.39	0.95	
2004	531.5	-0.20	0.75	Mild
2005	603.3	-0.09	0.66	Mild
2006	618.7	-0.07	0.59	Mild
2007	588	-0.12	0.47	Mild
2008	852.8	0.28	0.76	
2009	595.6	-0.10	0.65	Mild
2010	951.9	0.43	1.09	
2011	661.8	0.00	1.08	Mild
2012	559.4	-0.16	0.92	Mild
2013	708.9	0.07	0.99	
2014	440.4	-0.34	0.65	Normal
2015	547.5	-0.18	0.48	Mild
2016	656.1	-0.01	0.46	Mild
2017	512.49	-0.23	0.24	
2018	543.97	-0.18	0.05	
2019	499.44	-0.25	-0.19	
2020	485.4	-0.27	-0.46	
2021	972.34	0.46	0.00	
2022	668.58	0.01	0.01	
2023	746.58	0.12	0.13	

Rank	Probability in %	ARF in decreasing order
1	2.03	1025.2
2	5.09	974.6
3	8.08	951.9
4	11.08	925.9
5	14.07	861.4
6	17.07	853.3
7	20.06	852.8
8	23.05	827.6
9	26.05	808.0
10	29.04	800.6
11	32.04	784.6
12	35.03	771.6
13	38.02	708.9
14	41.02	661.8
15	44.01	656.1
16	47.01	646.2
17	50.00	641.6
18	52.99	618.7
19	55.99	617.4
20	58.98	614.7
21	61.98	603.3
22	64.97	595.6
23	67.96	588.0
24	70.96	579.2
25	73.95	559.4
26	76.95	547.5
27	79.94	544.2
28	82.93	533.7
29	85.93	531.5
30	88.92	459.5
31	91.92	446.4
32	94.91	440.4
33	97.90	434.2
34	100.90	303.6

ANNEXURE IIIA: WATER LEVEL MONITORING DATA (2023-24)

List of NHS/Monitoring station mointored during 2023-24, NCT of Delhi (water level in mbgl)									
District Name	Tehsil Name	Longitude	Latitude	Site_Name	May_23	Aug_23	Nov_23	Jan_24	PZ/DW
South East	KALKAJI	77.2511	28.5539	Aastha Kunj DWLR	8.95	5.17	8.18	8.84	PZ
North	ALIPUR	77.1244	28.7981	Alipur Garhi Pz	9.23	9.28	8.55	8.53	PZ
South East	KALKAJI	77.2667	28.4958	Asola Pz	46.97	43.94	43.97	45.43	PZ
North	NARELA	76.9972	28.8194	Auchandi Pz	3.34	1.4	1.78	2.4	PZ
North	ALIPUR	77.1517	28.8153	Bakoli	9.44	10.19	9.85	9.67	PZ
South	SAKET	77.2078	28.4200	Balbir Nagar DW	26.79	11.87	19.59	19.92	DW
East	PREET VIHAR	77.2875	28.6408	Bank Enclave Pz	4.01	1.74	3.06	3.27	PZ
North	NARELA	77.0736	28.8514	Bankner Pz	19.26	NA	19.69	19.02	PZ
West	PUNJABI BAGH	77.0167	28.6500	Baprola Dw	3.55	1.32	2.55	4.62	DW
North	NARELA	77.0625	28.7583	Barwala Pz	5.29	5.02	5.26	5.42	PZ
North	NARELA	77.0300	28.7869	Bawana JE Store	8.5	5.23	7.64	7.95	PZ
North	NARELA	77.0536	28.8233	Bawana WTP	11.04	10.2	10.36	12.82	PZ
North	MODEL TOWN	77.1628	28.7364	Bhalaswa Lake Pz	1.08	NA	NA	NA	PZ
South	SAKET	77.2083	28.4278	Bhatti Pz	47.37	34.38	40.4	41.13	PZ
New Delhi	CHANAKYAPURI	77.1986	28.6319	Birla Mandir DW	10.05	6.65	8.25	9.94	DW
Central	CIVIL LINES	77.2075	28.7689	Burari Augur Pz	5.17	2.93	3.85	3.44	PZ
Central	CIVIL LINES	77.1972	28.7331	Burari DJB Ex.Engg Office Pz	3.73	2.39	9.22	3.5	PZ
Shahdara	VIVEK VIHAR	77.3031	28.6611	CBD Shahdara	15.41	14.57	14.62	15.84	PZ
Central	KOTWALI	77.2358	28.6556	Chandini Chowk DW	6.81	6.1	6.3	6.7	DW
South West	KAPESHERA	77.0094	28.5464	Chhawla Pz	9.21	8.1	8.78	8.93	PZ
East	MAYUR VIHAR	77.3014	28.5872	Chilla Regulatorpz	9.95	8.56	8.95	9.51	PZ
East	MAYUR VIHAR	77.2986	28.6003	Chilla Saroda Pz	8.74	8.07	7.55	8.12	PZ
North	MODEL TOWN	77.1922	28.7244	Coronation Pillar Pz DJB RWTP	3.63	2.3	2.71	2.75	PZ
South West	NAJAFGARH	76.9086	28.5342	Daryapur Khurd PZ	2.02	1.97	1.26	1.62	PZ
South West	KAPESHERA	76.9653	28.5431	Daulatpur Pz	10.53	10.09	9.88	10.56	PZ
South West	NAJAFGARH	76.9750	28.6342	Dichaon Kalan DW	13.31	13.06	12.13	12.1	DW
South East	KALKAJI	77.2414	28.5325	DJB Overhead Tank GK-II Pz	5.31	NA	NA	6.46	PZ
South West	DWARKA	77.0261	28.5856	Dwarka S-16 (TP)	14.35	13.57	13.26	13.19	PZ
South West	DWARKA	77.0508	28.5672	Dwarka Sec-23 DDA Park	15.79	14.84	16.1	16.46	PZ
West	PATEL NAGAR	77.0569	28.5944	Dwarka Sec-5 DDA Park	14.59	12.98	12.77	12.82	PZ
South West	DWARKA	77.0628	28.5925	dwarka sec-6	15.9	15.32	15.03	15.01	PZ
South	MEHRAULI	77.1561	28.4769	Gadaipur Pz	66.84	67.2	67.41	68.17	PZ
East	PREET VIHAR	77.3181	28.6281	Gazi Pur Crossing pz	26.55	26.5	26.6	NA	PZ
South East	KALKAJI	77.2381	28.5417	GK 2 Metro Gate No.1	7.05	6.99	5.42	6.59	PZ
South East	KALKAJI	77.2397	28.5422	GK 2 Metro Gate No.2	6.85	6.86	6.78	5.95	PZ
South East	KALKAJI	77.2389	28.5422	GK 2 Metro North Side Tw	7.4	7.35	5.99	6.94	PZ
North East	YAMUNA VIHAR	77.2744	28.7042	Gokulpur E Pz	NA	NA	NA	28.31	PZ
East	KARAWAL NAGAR	77.2744	28.7042	Gokulpuri EW	27.51	27.48	28.36	NA	PZ
East	PREET VIHAR	77.2917	28.6422	Gujarat Vihar Pz	6.74	6.49	6.57	6.79	PZ
South West	NAJAFGARH	76.9125	28.5478	Gummanhera DW	3.62	3.98	2.62	2.59	DW
South East	KALKAJI	77.2417	28.5403	Gurudwara GK-II Pz	NA	NA	NA	6.46	PZ
North	ALIPUR	77.1469	28.7289	Haiderpur Pz	12.88	13.2	13.95	13.56	PZ
North	NARELA	77.0083	28.8319	Hareoli DW	4.3	1.85	2.17	3.89	DW
South	MEHRAULI	77.2022	28.5453	Hauz Khas Pz	22.91	22.87	21.55	21.06	PZ
West	PUNJABI BAGH	76.9942	28.6822	Hiran Kudna DW	2.59	0.84	1.9	2.63	DW
North	ALIPUR	77.1808	28.8011	Hiranki Village Pz	7.28	6.86	6.48	6.78	PZ
New Delhi	CHANAKYAPURI	77.2508	28.5950	Humayun Tomb DW	8.26	NA	7.9	8.44	DW
Central	CIVIL LINES	77.2306	28.6722	ISBT (Kasmiri Gate) DW	3.27	2.33	3.87	4.12	DW
Shahdara	VIVEK VIHAR	77.3142	28.6694	ITI Vivek Vihar	NA	NA	22.88	NA	
New Delhi	VASANT VIHAR	77.1569	28.5358	J N U Pz (Upstream)	14.62	13.31	14.26	14.97	PZ
Central	CIVIL LINES	77.2225	28.7400	Jagatpur Pz 2	2.3	1.04	1.68	1.68	PZ
South East	KALKAJI	77.2364	28.5328	Jahapana Park	9.78	NA	NA	NA	PZ
South East	KALKAJI	77.2333	28.5389	Jahapana Park DW	11.48	11.42	11.22	NA	DW
South East	SARITA VIHAR	77.3406	28.5089	Jaitpur Khadar RD3500 Pz	9.21	NA	4.95	8.5	PZ
South	SAKET	77.1822	28.5061	Jamali Kamali DW	14.5	11.13	11.96	13.34	DW
West	PATEL NAGAR	77.0914	28.6300	Janakpuri Pz	6.64	5.68	5.67	5.4	PZ
South	MEHRAULI	77.1500	28.4681	Jaunapur DJB TW	39.47	13.09	44.5	46.3	PZ

District Name	Tehsil Name	Longitude	Latitude	Site_Name	May_23	Aug_23	Nov_23	Jan_24	PZ/DW
North West	KANJHAWALA	76.9667	28.7528	Jaunti DW	11.56	10.76	10.32	9.56	DW
South	MEHRAULI	77.1894	28.4089	Jheel Khoh	52.85	50.42	50.6	51.23	DW
South West	NAJAFGARH	76.9047	28.5361	Jhuljhuli Dw	1.8	0.86	1.97	2.51	DW
New Delhi	DELHI CANTONMENT	77.1275	28.5922	Kabul Line Pz	30.58	30.52	30.22	29.96	PZ
West	PATEL NAGAR	77.0864	28.6525	Keshopur DJB WTP	9.79	9.8	9.95	9.63	PZ
North	MODEL TOWN	77.1811	28.7183	Kewal Park Pz	3.72	3.04	3.67	3.35	PZ
Central	KOTWALI	77.2347	28.6642	Khela ghat Bela Road TW	NA	1.56	2.85	2.85	PZ
Central	KOTWALI	77.2344	28.6644	Khela Ghat Bhela road	2.74	1.32	2.97	3.04	DW
North	ALIPUR	77.1181	28.7694	Khera Kalan Pz	11.47	12.41	11.03	10.92	PZ
East	Mayur Vihar	77.3217	28.6106	Kondli DJB WTP	26.47	26.42	26.79	27.01	PZ
NAZUL LAND	NAZUL LAND	77.2717	28.6325	Lalitha Park (Pz)	5.64	1.92	3.68	3.92	PZ
New Delhi	CHANAKYAPURI	77.2164	28.5903	Lodhi Garden.(SH)	4.29	3.09	3.53	3.41	PZ
New Delhi	CHANAKYAPURI	77.2206	28.5917	Lodhi Graden Dw	7.73	7.12	7.55	7.41	DW
New Delhi	CHANAKYAPURI	77.1750	28.6042	Mahabir Vansth.	21.67	20.87	21.35	21.89	PZ
North West	KANJHAWALA	77.0058	28.7556	Majara Dabas	3.17	2.27	2.4	2.8	PZ
Central	CIVIL LINES	77.2278	28.6958	Majnu Ka Tila DW	10.17	7.24	8.67	8.6	DW
North West	ROHINI	77.0792	28.6903	Mangolpuri Pz	3.41	3.57	3.61	3.35	PZ
West	RAJOURI GARDEN	77.1111	28.6186	Mayapuri Pz	36.04	35.91	36.35	36.15	PZ
East	MAYUR VIHAR	77.3044	28.6164	Mayur Vihar B Block Ph II pz	7.98	7.62	7.55	8.1	PZ
South East	KALKAJI	77.2436	28.5342	M-Block Park GK-II Pz	NA	NA	NA	6.78	PZ
South West	NAJAFGARH	76.8933	28.6064	Mundela Kalan Pz	7.9	7.32	7.61	8.1	PZ
South West	NAJAFGARH	77.0006	28.6147	Najafgarh Town	16.3	15	14.37	14.49	PZ
South East	DEFENCE COLONY	77.2733	28.5944	Nangli Rajapur Pz	2.8	2.73	2.67	2.82	PZ
North	ALIPUR	77.1344	28.8367	Narela DJB WTP	17.41	18.67	19.02	18	PZ
New Delhi	CHANAKYAPURI	77.2100	28.6061	Nehru Park Dw	17.42	17.13	17.48	18.61	DW
North West	KANJHAWALA	76.9667	28.7194	Nizampur EW	5.42	NA	4.08	4.82	PZ
North West	KANJHAWALA	76.9636	28.7200	Nizampur Mandir Dw	3.9	3.5	3.5	4.27	DW
South West	Najafgarh	76.9142	28.5767	Ojwah Pz	9.71	8.87	9.2	10.53	PZ
South East	KALKAJI	77.2733	28.5642	Okhla DJB WTP Pz	7.56	7.51	7.18	7.62	PZ
North	ALIPUR	77.2036	28.8225	Palla Temple	9.03	10.78	16.09	9.42	PZ
North	ALIPUR	77.1964	28.8581	Palla Zero RD	10.1	7.33	7.73	8.17	PZ
West	PUNJABI BAGH	77.0933	28.6756	Peeragarhi DW	5.8	5.7	5.53	6.34	DW
West	PUNJABI BAGH	77.0947	28.6781	Peeragarhi Pz	3.02	3.1	3.69	4.52	PZ
West	PATEL NAGAR	77.1622	28.6392	PUSA (NRL) Pz	30.16	30.31	25.07	31.6	PZ
New Delhi	DELHI CANTONMENT	77.1594	28.6319	Pusa Institute (WTC)	NA	NA	40.63	41.83	PZ
South	HAUZ KHAS	77.2267	28.5278	Pusp Vihar Pz	37.45	37.26	36.48	35.99	PZ
North	NARELA	77.0331	28.8503	Qatlupur Dw	3.92	1.9	2.62	2.64	DW
North West	SARASWATI VIHAR	77.0333	28.8419	Qatlupur Pz	1.65	NA	1.61	2.6	PZ
North West	KANJHAWALA	76.9647	28.8056	Qutubgarh	4.96	3.8	4.3	4.32	PZ
New Delhi	VASANT VIHAR	77.1853	28.5567	R.K Puram Sec-3	NA	18.96	18.85	19.25	PZ
North West	ROHINI	77.0183	28.7089	Rani Khera DW	1.2	1	1.13	1.22	DW
South West	KAPESHERA	76.9042	28.5181	Raota Dw	2.4	0.53	1.63	2.82	DW
South East	KALKAJI	77.2417	28.5467	R-Block, GK-1	7.55	7.58	NA	NA	PZ
North West	ROHINI	77.1017	28.7150	Rithala Pz Sec5 Rohini	2.74	2.98	3.31	NA	PZ
North West	ROHINI	77.1044	28.7322	Rohini Sec 11 Pz	5.26	4.91	5.25	5.72	PZ
North West	ROHINI	77.0708	28.7242	Rohini Sector 23	1.24	0.8	0.84	1	PZ
North	NARELA	77.0950	28.7528	Rohini Sector 28	5.9	5.9	5.65	6.42	PZ
South East	KALKAJI	77.2475	28.5339	S Block Park GK-II Pz	9.24	NA	9.23	5.72	PZ
New Delhi	CHANAKYAPURI	77.2125	28.5903	Safdarjung tomb	13.91	9.76	9.86	11	DW
North West	SARASWATI VIHAR	77.1219	28.6911	Sainik Vihar Pz	2.68	1.95	2.75	3.93	PZ
North	ALIPUR	77.1525	28.7406	Samaypur Badli Pz	8.51	8.25	8.44	8.46	PZ
North West	SARASWATI VIHAR	77.1461	28.6950	Sandesh Vihar Pz	4.12	3.36	4.17	2.68	PZ
North West	SARASWATI VIHAR	77.1419	28.6903	Sanjay Van Pz	2.99	2.4	2.78	2.7	PZ
North West	ROHINI	77.0981	28.7028	Sector 1 Rohini Pz	3.02	3	3.24	2.8	PZ
South East	KALKAJI	77.2419	28.5375	Sehgal Market-1 GK-II Pz	2.69	2.71	2.72	2.7	PZ
South East	KALKAJI	77.2408	28.5356	Sehgal Market-2 GK-II Pz	12.4	12.4	12.42	12.41	PZ
New Delhi	CHANAKYAPURI	77.1900	28.5967	Shanti Path American Embassy	21.33	21.33	NA	20.93	PZ
North East	SEELAMPUR	77.2617	28.6756	Shastri Park (Pz)	6.01	5.97	4.78	4.82	PZ
New Delhi	DELHI CANTONMENT	77.1078	28.5783	Shekhwati Line Pz	NA	44.41	42.98	43.03	PZ
South West	KAPESHERA	76.9533	28.5247	Shikarpur Shallow Pz	6.05	6.29	NA	6.49	PZ
New Delhi	CHANAKYAPURI	77.2125	28.6153	Shram Shakti Bhawan 1	NA	NA	7.8	8.12	PZ

District Name	Tehsil Name	Longitude	Latitude	Site_Name	May_23	Aug_23	Nov_23	Jan_24	PZ/DW
New Delhi	CHANAKYAPURI	77.2125	28.6153	Shram Shakti Bhawan 2	8.07	6.58	7.71	NA	PZ
North	ALIPUR	77.1294	28.8433	Singhola Pz	19.48	20.33	20.55	20.32	PZ
North	ALIPUR	77.1311	28.8533	Singhu Village Pz	20.75	23.19	22.23	21.93	PZ
Central	CIVIL LINES	77.2486	28.7075	Sonia Vihar DJB WTP pz	12.1	9.07	9.75	10.65	PZ
North West	ROHINI	77.0356	28.7650	Sultanpur Dabas	5.32	4.89	4.65	5.07	PZ
New Delhi	VASANT VIHAR	77.1458	28.4894	Sultanpur IMS Pz	65.9	66.28	66.82	67.6	PZ
New Delhi	CHANAKYAPURI	77.2450	28.5961	Sunder Nursery Pz	6.04	4.75	5.3	5.4	PZ
South West	NAJAFGARH	76.9342	28.6011	Surheda dw	NA	10.52	10.21	11.1	DW
South West	NAJAFGARH	76.9322	28.6039	Surheda tw	10.4	9.98	10.35	11.12	PZ
West	RAJOURI GARDEN	77.1128	28.6439	Tagore Garden	14.27	14.02	13.6	13.16	PZ
North	ALIPUR	77.1975	28.8147	Tiggipur Shallow Pz	7.09	6.21	5.78	6.14	PZ
West	PUNJABI BAGH	76.9694	28.6833	Tikri Kalan Pz	8.37	8.9	8.84	5.75	PZ
NAZUL LAND	NAZUL LAND	77.2492	28.6847	Ushmanpur Pz	4.24	NA	2.2	3.24	PZ
West	PATEL NAGAR	77.0742	28.6322	Vikashpuri Pz	8.18	7.42	7.8	7.66	PZ
Shahdara	VIVEK VIHAR	77.3131	28.6708	Vivek Vihar (Pz)	21.53	21.57	22	21.96	PZ
Shahdara	SHAHDARA	77.3089	28.6603	Yamuna Sports Complex TW-1	NA	NA	18.3	NA	PZ
Shahdara	SHAHDARA	77.3106	28.6603	Yamuna Sports Complex TW-2	NA	NA	19.56	NA	PZ
Shahdara	SHAHDARA	77.3092	28.6606	Yamuna Sports Complex TW-3	NA	NA	17.41	NA	PZ
North East	YAMUNA VIHAR	77.2872	28.6972	Yamuna Vihar DJB WTP	24.95	24.83	25.46	NA	PZ
List of Deeper Aquifer NHS/Monitoring station mointored during 2023-24									
North	ALIPUR	77.1517	28.8153	Bakoli Deep Pz	9.9	10.6	10.05	10	PZ
New Delhi	DELHI CANTONMENT	77.1111	28.6033	Cvd Depot Cant (Deep)	25.76	27	27.87	27.82	PZ
New Delhi	CHANAKYAPURI	77.2164	28.5903	Lodhi Garden (D)	4.56	3.45	3.93	3.63	PZ
South West	KAPESHERA	76.9533	28.5244	Shikarpur Deep Pz	6.1	6.35	NA	6.83	PZ
North	ALIPUR	77.1972	28.8147	Tiggipur Deep Pz	7.81	5.57	6.49	6.82	PZ

ANNEXURE IIIB: DECADAL MEAN WATER LEVEL DATA

List of NHS/Monitoring station monitored during 2014-23 and Decadal Mean				
Decadal Mean Water Level in m bgl				
SITE_NAME	**DM (2013-22) May**	**DM (2013-22) Aug**	**DM (2013-22) Nov**	**DM (2014-23) Jan**
Asola Pz	50.97	50.13	49.04	48.89
Auchandi Pz	3.19	1.34	2.00	2.45
Bakoli	10.95	12.06	10.64	10.33
Balbir Nagar DW	23.35	12.26	17.14	21.04
Bankner Pz	20.68	NA	21.71	21.44
Baprola Dw	3.86	2.52	2.72	3.10
Barwala Pz	6.02	5.59	5.73	5.69
Bhalaswa Lake Pz	2.27	NA	NA	NA
Bhatti Pz	50.82	48.65	46.40	48.10
Birla Mandir DW	12.56	9.42	9.19	10.45
Burari Augur Pz	4.71	4.01	4.91	4.74
Burari Pz	3.53	NA	NA	NA
CBD Shahdara	12.40	12.26	12.35	12.55
Chandini Chowk DW	6.95	6.23	6.68	6.90
Chhawla Pz	14.00	12.67	12.29	12.26
Chilla Regulator	9.71	9.47	9.64	9.47
Chilla Saroda Pz	10.04	9.88	9.83	9.68
Daryapur Khurd	4.12	NA	NA	4.03
Daulatpur Pz	14.62	13.90	13.71	14.30
Dwarka S-16 (TP)	NA	20.76	20.59	20.43
Gadaipur Pz	61.76	61.22	61.51	57.51
Gazi Pur Crossing	22.49	22.54	22.01	NA
Gokulpur E Pz	13.85	NA	NA	NA
Haiderpur Pz	11.97	12.65	11.79	11.56
Hareoli DW	4.32	3.16	2.54	3.10
Hauz Khas Pz	32.08	31.94	31.54	31.13
Hiran Kudna DW	3.04	1.48	2.10	2.26
Humayun Tomb DW	6.61	NA	7.13	6.72
ISBT (Kasmiri Gate) DW	2.85	1.42	2.55	3.06
J N U Pz (Upstream)	25.88	23.08	22.94	23.79
Jagatpur Pz 2	2.51	0.98	1.68	1.58
Jaitpur Khadar RD3500 Pz	7.45	NA	6.81	7.63
Jamali Kamali DW	25.39	22.86	22.93	22.02
Janakpuri Pz	11.07	10.59	10.60	10.63
Jaunapur DJB TW	53.50	51.20	50.56	51.30
Jaunti DW	12.72	12.33	12.36	11.66
Jheel Khoh DW	55.52	51.68	NA	55.75
Jhuljhuli Dw	2.15	0.98	2.21	1.97
Kabul Line Pz	29.66	29.71	29.91	29.60
Lodhi Garden.(SH)	7.56	6.93	6.82	6.45
Lodhi Graden Dw	10.54	10.62	9.58	10.32
Mahabir Vansth.	26.37	26.06	26.38	26.06
Majara Dabas	3.46	2.31	2.90	2.97
Majnu Ka Tila DW	9.91	7.31	8.13	7.88
Mangolpuri Pz	3.31	2.37	2.83	2.92
Mayapuri Pz	37.15	36.84	37.05	36.72
Mayur Vihar B Block Ph II	8.22	8.07	8.33	8.22
Najafgarh Town	20.95	20.92	20.46	20.33
Nangli Rajapur Pz	NA	2.87	3.90	3.35
Nehru Park Dw	27.45	21.70	20.90	20.92
Nizampur EW	7.34	NA	6.60	6.86
Ojwah Pz	NA	NA	NA	15.39
Palla Temple	8.24	6.96	7.67	7.62
Palla Zero RD	9.29	9.95	9.44	9.01

SITE_NAME	DM (2013-22) May	DM (2013-22) Aug	DM (2013-22) Nov	DM (2014-23) Jan
Peeragarhi DW	8.42	7.56	7.62	NA
Peeragarhi Pz	5.49	4.55	4.61	4.44
PUSA (NRL) Pz	26.97	27.02	27.57	27.08
Pusa Institute (WTC)	NA	NA	22.84	23.56
Pusp Vihar Pz	55.15	54.70	53.45	52.44
Qatlupur Pz	2.81	NA	NA	1.89
Rani Khera DW	2.35	1.13	1.42	1.80
Raota Dw	NA	1.41	1.73	2.09
Rohini Sec 11 Pz	6.43	5.78	5.69	5.78
Rohini Sector 23	1.32	NA	NA	NA
Rohini Sector 28	6.23	5.53	5.69	5.81
Safdarjung tomb	15.67	14.09	14.83	13.79
Sainik Vihar Pz	3.02	1.65	2.41	2.44
Shekhwati Line Pz	NA	44.36	43.75	44.06
Shikarpur Shallow Pz	10.15	10.66	NA	9.50
Shram Shakti Bhawan 1	12.21	NA	12.32	10.83
Shram Shakti Bhawan 2	NA	11.33	11.06	NA
Singhola Pz	17.38	17.36	17.91	17.27
Sultanpur IMS Pz	59.71	59.52	60.14	60.47
Sunder Nursery Pz	7.51	7.02	6.89	6.89
Surheda TW	13.21	12.13	12.35	13.16
Tagore Garden Pz	13.59	12.64	13.12	13.05
Tiggipur Shallow Pz	7.67	7.55	7.15	7.35
Tikri Kalan Pz	NA	8.60	NA	8.86
Ushmanpur Pz	5.30	NA	3.42	4.33
Vikashpuri Pz	13.88	13.41	13.31	12.91
List of Deeper Aquifer NHS/Monitoring station monitored during 2014-23 and Decadal Mean				
Tiggipur Deep Pz	9.33	9.74	8.93	8.71
Shikarpur Deep Pz	10.20	10.70	NA	9.45
Lodhi Garden (D)	7.74	24.16	7.05	6.80
Cvd Depot Cant (Deep)	24.61	7.16	23.25	24.85
Bakoli Deep Pz	11.04	12.49	10.82	10.62

Annexure IV(A): Ground Water Level Depth Range of Monitoring Stations, May-2023, NCT Delhi

Ground water Level Depth Range of Monitoring Station , NCT Delhi														
District Name	Tehsil Name	Total Monitoring Wells	Water level May 2023											
			0-2 m bgl		>2-5 m bgl		>5- 10 mbgl		>10- 20 mbgl		>20- 40 mbgl		>40 mbgl	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
New Delhi	Chanakyapuri	11	0	0.00	2	18.18	4	36.36	3	27.27	2	18.18	0	0.00
	Delhi Contoment	2	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00	0	0.00
	Vasant Vihar	2	0	0.00	0	0.00	0	0.00	1	50.00	0	0.00	1	50.00
North	Alipur	14	0	0.00	0	0.00	8	57.14	5	35.71	1	7.14	0	0.00
	Narela	8	0	0.00	3	37.50	3	37.50	2	25.00	0	0.00	0	0.00
	Model Town	3	1	33.33	2	66.67	0	0.00	0	0.00	0	0.00	0	0.00
North West	Saraswati Vihar	4	0	0.00	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
	Khanjhwala	5	0	0.00	3	60.00	1	20.00	1	20.00	0	0.00	0	0.00
	Rohini	7	2	28.57	3	42.86	2	28.57	0	0.00	0	0.00	0	0.00
North East	Yamuna Vihar	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
	Karawal Nagar	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
	Seelampur	1	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Central	Civil lines	6	0	0.00	3	50.00	1	16.67	2	33.33	0	0.00	0	0.00
	Kotwali	2	0	0.00	1	50.00	1	50.00	0	0.00	0	0.00	0	0.00
	Karol Bagh	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
South	Mehrauli	4	0	0.00	0	0.00	0	0.00	0	0.00	2	50.00	2	50.00
	Saket	3	0	0.00	0	0.00	0	0.00	1	33.33	1	33.33	1	33.33
	Hauz Khas	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
South West	Dwarka	3	0	0.00	0	0.00	0	0.00	3	100.00	0	0.00	0	0.00
	Najafgarh	8	1	12.50	2	25.00	2	25.00	3	37.50	0	0.00	0	0.00
	Kapashera	5	0	0.00	1	20.00	3	60.00	1	20.00	0	0.00	0	0.00
East	Preet Vihar	3	0	0.00	1	33.33	1	33.33	0	0.00	1	33.33	0	0.00
	Mayur Vihar	4	0	0.00	0	0.00	3	75.00	0	0.00	1	25.00	0	0.00
	Gandhi Nagar	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
West	Patel Nagar	5	0	0.00	0	0.00	3	60.00	1	20.00	1	20.00	0	0.00
	Punjabi Bagh	5	0	0.00	3	60.00	2	40.00	0	0.00	0	0.00	0	0.00
	Rajouri Garden	2	0	0.00	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00
Shahdara	Shahdara	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	Vivek Vihar	2	0	0.00	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00
	Seemapuri	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
South East	Defence Colony	1	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
	Kalkaji	13	0	0.00	1	7.69	9	69.23	2	15.38	0	0.00	1	7.69
	Sarita Vihar	1	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Nazul Land	Nazul Land	2	0	0.00	1	50.00	1	50.00	0	0.00	0	0.00	0	0.00
Total		**129**	**4**	**3.10**	**31**	**24.03**	**46**	**35.66**	**27**	**20.93**	**16**	**12.40**	**5**	**3.88**

Annexure IV(B): Ground Water Level Depth Range of Monitoring Stations, August-2023, NCT Delhi

Ground water Level Depth Range of Monitoring Station , NCT Delhi														
District Name	Tehsil Name	Total Monitoring Wells	Water level Aug 2023											
			0-2 m bgl		>2-5 m bgl		>5- 10 mbgl		>10- 20 mbgl		>20- 40 mbgl		>40 mbgl	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
New Delhi	Chanakyapuri	10	0	0.00	3	30.00	4	40.00	1	10.00	2	20.00	0	0.00
	Delhi Contoment	3	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67	1	33.33
	Vasant Vihar	3	0	0.00	0	0.00	0	0.00	2	66.67	0	0.00	1	33.33
North	Alipur	14	0	0.00	0	0.00	6	42.86	6	42.86	2	14.29	0	0.00
	Narela	7	3	42.86	0	0.00	3	42.86	1	14.29	0	0.00	0	0.00
	Model Town	2	0	0.00	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00
North West	Saraswati Vihar	3	1	33.33	2	66.67	0	0.00	0	0.00	0	0.00	0	0.00
	Khanjhwala	4	0	0.00	3	75.00	0	0.00	1	25.00	0	0.00	0	0.00
	Rohini	7	2	28.57	5	71.43	0	0.00	0	0.00	0	0.00	0	0.00
North East	Yamuna Vihar	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
	Karawal Nagar	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
	Seelampur	1	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Central	Civil lines	6	1	16.67	3	50.00	2	33.33	0	0.00	0	0.00	0	0.00
	Kotwali	3	2	66.67	0	0.00	1	33.33	0	0.00	0	0.00	0	0.00
	Karol Bagh	0	0	0	0	0	0	0	0	0	0	0	0	0
South	Mehrauli	4	0	0.00	0	0.00	0	0.00	1	25.00	1	25.00	2	50.00
	Saket	3	0	0.00	0	0.00	0	0.00	2	66.67	1	33.33	0	0.00
	Hauz Khas	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
South West	Dwarka	3	0	0.00	0	0.00	0	0.00	3	100.00	0	0.00	0	0.00
	Najafgarh	9	2	22.22	1	11.11	3	33.33	3	33.33	0	0.00	0	0.00
	Kapashera	5	1	20.00	0	0.00	3	60.00	1	20.00	0	0.00	0	0.00
East	Preet Vihar	3	1	33.33	0	0.00	1	33.33	0	0.00	1	33.33	0	0.00
	Mayur Vihar	4	0	0.00	0	0.00	3	75.00	0	0.00	1	25.00	0	0.00
	Gandhi Nagar	0	0	0	0	0	0	0	0	0	0	0	0	0
West	Patel Nagar	5	0	0.00	0	0.00	3	60.00	1	20.00	1	20.00	0	0.00
	Punjabi Bagh	5	2	40.00	1	20.00	2	40.00	0	0.00	0	0.00	0	0.00
	Rajouri Garden	2	0	0.00	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00
Shahdara	Shahdara	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vivek Vihar	2	0	0.00	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00
	Seemapuri	0	0	0	0	0	0	0	0	0	0	0	0	0
South East	Defence Colony	1	0	0.00	1	100.00	0	0	0	0	0	0	0	0
	Kalkaji	10	0	0.00	1	10.00	6	60.00	2	20.00	0	0.00	1	10.00
	Sarita Vihar	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Nazul Land	Nazul Land	1	1	100.00	0	0	0	0	0	0	0	0	0	0
Total		**123**	**16**	**13.01**	**22**	**17.89**	**38**	**30.89**	**26**	**21.14**	**16**	**13.01**	**5**	**4.07**

Annexure IV(C): Ground Water Level Depth Range of Monitoring Stations, November-2023, NCT Delhi

Ground water Level Depth Range of Monitoring Station , NCT Delhi														
District Name	Tehsil Name	Total Monitoring Wells	Water level Nov 2023											
			0-2 m bgl		>2-5 m bgl		>5- 10 mbgl		>10- 20 mbgl		>20- 40 mbgl		>40 mbgl	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
New Delhi	Chanakyapuri	11	0	0.00	2	18.18	7	63.64	1	9.09	1	9.09	0	0.00
	Delhi Contoment	4	0	0.00	0	0.00	0	0.00	0	0.00	2	50.00	2	50.00
	Vasant Vihar	3	0	0.00	0	0.00	0	0.00	2	66.67	0	0.00	1	33.33
North	Alipur	14	0	0.00	0	0.00	7	50.00	5	35.71	2	14.29	0	0.00
	Narela	8	1	12.50	2	25.00	3	37.50	2	25.00	0	0.00	0	0.00
	Model Town	2	0	0.00	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00
North West	Saraswati Vihar	4	1	25.00	3	75.00	0	0.00	0	0.00	0	0.00	0	0.00
	Khanjhwala	5	0	0.00	4	80.00	0	0.00	1	20.00	0	0.00	0	0.00
	Rohini	7	2	28.57	4	57.14	1	14.29	0	0.00	0	0.00	0	0.00
North East	Yamuna Vihar	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
	Karawal Nagar	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
	Seelampur	1	0	0.00	1	100.00	0	0	0	0	0	0	0	0
Central	Civil lines	6	1	16.67	2	33.33	3	50.00	0	0	0	0	0	0
	Kotwali	3	0	0.00	2	66.67	1	33.33	0	0	0	0	0	0
	Karol Bagh	0	0	0	0	0	0	0	0	0	0	0	0	0
South	Mehrauli	4	0	0	0	0	0	0	0	0	1	25	3	75
	Saket	3	0	0.00	0	0.00	0	0.00	1	33.33	2	66.67	0	0.00
	Hauz Khas	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
South West	Dwarka	3	0	0.00	0	0.00	0	0.00	3	100.00	0	0.00	0	0.00
	Najafgarh	9	2	22.22	1	11.11	2	22.22	4	44.44	0	0.00	0	0.00
	Kapashera	3	1	33.33	0	0.00	2	66.67	0	0.00	0	0.00	0	0.00
East	Preet Vihar	3	0	0.00	1	33.33	1	33.33	0	0.00	1	33.33	0	0.00
	Mayur Vihar	4	0	0.00	0	0.00	3	75.00	0	0.00	1	25.00	0	0.00
	Gandhi Nagar	0	0	0	0	0	0	0	0	0	0	0	0	0
West	Patel Nagar	5	0	0.00	0	0.00	3	60.00	1	20.00	1	20.00	0	0.00
	Punjabi Bagh	5	1	20.00	2	40.00	2	40.00	0	0	0	0	0	0
	Rajouri Garden	2	0	0.00	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00
Shahdara	Shahdara	3	0	0	0	0	0	0	3	100	0	0	0	0
	Vivek Vihar	3	0	0.00	0	0.00	0	0.00	1	33.33	2	66.67	0	0.00
	Seemapuri	0	0	0	0	0	0	0	0	0	0	0	0	0
South East	Defence Colony	1	0	0.00	1	100.00	0	0	0	0	0	0	0	0
	Kalkaji	10	0	0.00	1	10.00	6	60.00	2	20.00	0	0.00	1	10.00
	Sarita Vihar	1	0	0.00	1	100.00	0	0	0	0	0	0	0	0
Nazul Land	Nazul Land	2	0	0.00	2	100	0	0	0	0	0	0	0	0
Total		**132**	**9**	**6.82**	**31**	**23.48**	**41**	**31.06**	**27**	**20.45**	**17**	**12.88**	**7**	**5.30**

Annexure IV (D): Ground Water Level Depth Range of Monitoring Stations, January-2024, NCT Delhi

Ground water Level Depth Range of Monitoring Station , NCT Delhi														
District Name	Tehsil Name	Total Monitoring Wells	Water level Jan 2024											
			0-2 m bgl		>2-5 m bgl		>5- 10 mbgl		>10- 20 mbgl		>20- 40 mbgl		>40 mbgl	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
New Delhi	Chanakyapuri	11	0	0.00	2	18.18	5	45.45	2	18.18	2	18.18	0	0.00
	Delhi Contoment	5	0	0.00	0	0.00	0	0.00	1	20.00	2	40.00	2	40.00
	Vasant Vihar	3	0	0.00	0	0.00	0	0.00	2	66.67	0	0.00	1	33.33
North	Alipur	14	0	0.00	0	0.00	9	64.29	3	21.43	2	14.29	0	0.00
	Narela	8	0	0.00	3	37.50	3	37.50	2	25.00	0	0.00	0	0.00
	Model Town	2	0	0.00	2	100.00	0	0	0	0	0	0	0	0
North West	Saraswati Vihar	4	0	0.00	4	100.00	0	0	0	0	0	0	0	0
	Khanjhwala	5	0	0.00	4	80.00	1	20.00	0	0	0	0	0	0
	Rohini	6	2	33.33	2	33.33	2	33.33	0	0	0	0	0	0
North East	Yamuna Vihar	1	0	0	0	0	0	0	0	0.00	1	100.00	0	0.00
	Karawal Nagar	0	0	0	0	0	0	0	0	0	0	0	0	0
	Seelampur	1	0	0.00	1	100.00	0	0	0	0	0	0	0	0
Central	Civil lines	6	1	16.67	3	50.00	1	16.67	1	16.67	0	0.00	0	0.00
	Kotwali	3	0	0.00	2	66.67	1	33.33	0	0.00	0	0.00	0	0.00
	Karol Bagh	0	0	0	0	0	0	0	0	0	0	0	0	0
South	Mehrauli	4	0	0	0	0	0	0	0	0.00	1	25.00	3	75.00
	Saket	3	0	0.00	0	0.00	0	0.00	2	66.67	0	0.00	1	33.33
	Hauz Khas	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
South West	Dwarka	3	0	0	0	0.00	0	0.00	3	100.00	0	0.00	0	0.00
	Najafgarh	9	1	11.11	2	22.22	1	11.11	5	55.56	0	0	0	0
	Kapashera	5	0	0.00	1	20.00	3	60.00	1	20.00	0	0	0	0
East	Preet Vihar	2	0	0.00	1	50.00	1	50.00	0	0.00	0	0.00	0	0.00
	Mayur Vihar	4	0	0.00	0	0.00	3	75.00	0	0	1	25	0	0
	Gandhi Nagar	0	0	0	0	0	0	0	0	0	0	0	0	0
West	Patel Nagar	6	0	0.00	1	16.67	3	50.00	1	16.67	1	16.67	0	0.00
	Punjabi Bagh	4	0	0.00	2	50.00	2	50.00	0	0	0	0	0	0
	Rajouri Garden	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
Shahdara	Shahdara	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vivek Vihar	2	0	0.00	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00
	Seemapuri	0	0	0	0	0	0	0	0	0	0	0	0	0
South East	Defence Colony	1	0	0.00	1	100.00	0	0	0	0	0	0	0	0
	Kalkaji	12	0	0.00	1	11.11	9	75.00	1	8.33	0	0.00	1	8.33
	Sarita Vihar	1	0	0.00	0	0.00	1	100.00	0	0	0	0	0	0
Nazul Land	Nazul Land	2	0	0.00	2	100	0	0	0	0	0	0	0	0
Total		**129**	**4**	**3.10**	**34**	**26.36**	**45**	**34.88**	**25**	**19.38**	**13**	**10.08**	**8**	**6.20**

Annexure V(A): Decadal Water Level Fluctuation with Mean [Pre-monsoon (2013 to 2022) and Pre- monsoon 2023]

S. No.	Name of District	Name of Tehsil	No. of wells Analysed	Range in m				Rise						Fall						Rise		Fall		Wells showing no change	
				Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m							
				Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	CENTRAL	CIVIL LINES	5		0.21	0.46	0.26	1	100					4	100					1	20	4	80	0	0
2	CENTRAL	KAROL BAGH	0																						
3	CENTRAL	KOTWALI	1		0.14			1	100											1	100			0	0
4	EAST	GANDHI NAGAR	0																					0	0
5	EAST	MAYUR VIHAR	3	0.24	1.3		0.24	2	100					1	100					2	67	1	33	0	0
6	EAST	PREET VIHAR	1				4.06											1	100			1	100	0	0
7	NAZUL LAND	NAZUR LAND	1		1.06			1	100											1	100			0	0
8	NEW DELHI	CHANAKYAPURI	10	1.47	10.03		1.65	2	22	4	44	3	33	1	100					9	90	1	10	0	0
9	NEW DELHI	DELHI CANTONMENT	2			0.92	1.16							2	100					0	0	2	100	0	0
10	NEW DELHI	VASANT VIHAR	2		11.26		6.19					1	100					1	100	1	50	1	50	0	0
11	NORTH	ALIPUR	8	0.58	1.52	0.8	2.1	4	100					3	75	1	25			4	50	4	50	0	0
12	NORTH	MODEL TOWN	1		1.19			1	100											1	100				0
13	NORTH	NARELA	5	0.02	1.42		0.15	4	100					1	100					4	80	1	20	0	0
14	NORTH EAST	KARAWAL NAGAR	1				13.66											1	100			1	100	0	0
15	NORTH EAST	SEELAMPUR	0																					0	0
16	NORTH EAST	YAMUNA VIHAR	0																					0	0
17	NORTH WEST	KANJHAWALA	3	0.29	1.92			3	100											3	100			0	0
18	NORTH WEST	ROHINI	4	0.08	1.17		0.1	3	100					1	100					3	75	1	25	0	0
19	NORTH WEST	SARASWATI VIHAR	2	0.34	1.16			2	100											2	100			0	0
20	SHAHDARA	SEEMAPURI	0																					0	0
21	SHAHDARA	SHAHDARA	0																					0	0
22	SHAHDARA	VIVEK VIHAR	1				3.01									1	100					1	100	0	0
23	SOUTH	HAUZ KHAS	1		17.7							1	100							1	100			0	0
24	SOUTH	MEHRAULI	4	2.67	14.03		5.08			1	33	2	67					1	100	3	75	1	25	0	0
25	SOUTH	SAKET	3	3.45	10.89		3.44			1	50	1	50			1	100			2	67	1	33	0	0
26	SOUTH EAST	DEFENCE COLONY	0																					0	0
27	SOUTH EAST	KALKAJI	1		4					1	100									1	100			0	0
28	SOUTH EAST	SARITA VIHAR	1				1.76							1	100							1	100	0	0
29	SOUTH WEST	DWARKA	0																					0	0
30	SOUTH WEST	KAPASHERA	4	1.09	4.79							4	100							4	100			0	0
31	SOUTH WEST	NAJAFGARH	4	0.35	4.65			1	25	2	50	1	25							4	100			0	0
32	WEST	PATEL NAGAR	3	4.43	5.7		3.19					2	100			1	100			2	67	1	33	0	0
33	WEST	PUNJABI BAGH	4	0.31	2.62			2	50	2	50									4	100			0	0
34	WEST	RAJOURI GARDEN	2		1.11		0.68	1	100					1	100					1	50	1	50	0	0
Total			77					28		11		15		15		4		4		54		23			

Annexure V(B): Decadal Water Level Fluctuation with Mean [Post-monsoon (2013 to 2022) and Post- monsoon 2023]

S. No.	Name of District	Name of Tehsil	No. of wells Analysed	Range in m				Rise						Fall						Rise		Fall		Wells showing no change	
				Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m							
				Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	CENTRAL	CIVIL LINES	4		1.06	0.54	1.32	1	100					2	100					1	25	2	50	1	25
2	CENTRAL	KAROL BAGH	0																	0		0		0	0
3	CENTRAL	KOTWALI	1		0.38			1	100											1	100	0		0	0
4	EAST	GANDHI NAGAR	0																	0		0		0	0
5	EAST	MAYUR VIHAR	3	0.69	2.28			2	67	1	33									3	100	0	0	0	0
6	EAST	PREET VIHAR	1				4.59											1	100	0	0	1	100	0	0
7	NAZUL LAND	NAZUR LAND	1		1.22			1	100											1	100	0	0	0	0
8	NEW DELHI	CHANAKYAPURI	11	0.94	5.03		0.77	2	20	5	50	3	30	1	100					10	91	1	9	0	0
9	NEW DELHI	DELHI CANTONMENT	4		0.77	0.31	17.79	1	100					1	33.3			2	67	1	25	3	75	0	0
10	NEW DELHI	VASANT VIHAR	2		8.86		6.68					1	100					1	100	1	50	1	50	0	0
11	NORTH	ALIPUR	8	0.77	2.44	2.16	8.42	4	80	1	20					2	67	1	33	5	62.5	3	37.5	0	0
12	NORTH	MODEL TOWN	0																	0		0		0	0
13	NORTH	NARELA	5	0.04	2.02			4	80	1	20		0							5	100	0	0	0	0
14	NORTH EAST	KARAWAL NAGAR	0																	0		0		0	0
15	NORTH EAST	SEELAMPUR	0																	0		0		0	0
16	NORTH EAST	YAMUNA VIHAR	0																	0		0		0	0
17	NORTH WEST	KANJHAWALA	3	0.5	2.52			1	33	2	67									3	100	0	0	0	0
18	NORTH WEST	ROHINI	3	0.29	0.66		0.78	2	100					1	100		0		0	2	67	1	33	0	0
19	NORTH WEST	SARASWATI VIHAR	1				0.34							1	100		0		0	0	0	1	100	0	0
20	SHAHDARA	SEEMAPURI	0																	0		0		0	0
21	SHAHDARA	SHAHDARA	0																	0		0		0	0
22	SHAHDARA	VIVEK VIHAR	1				2.28									1	100		0	0	0	1	100	0	0
23	SOUTH	HAUZ KHAS	1		16.97							1	100							1	100	0	0	0	0
24	SOUTH	MEHRAULI	3	6.06	9.99		5.9					2	100				0	1	100	2	67	1	33	0	0
25	SOUTH	SAKET	3	6	10.97		2.45					2	100			1	100		0	2	67	1	33	0	0
26	SOUTH EAST	DEFENCE COLONY	1		1.23			1	100											1	100	0		0	0
27	SOUTH EAST	KALKAJI	1		5.07							1	100							1	100	0		0	0
28	SOUTH EAST	SARITA VIHAR	1		1.86			1	100											1	100	0		0	0
29	SOUTH WEST	DWARKA	1		7.33							1	100							1	100	0		0	0
30	SOUTH WEST	KAPASHERA	3	0.1	3.83			1	33	2	67									3	100	0		0	0
31	SOUTH WEST	NAJAFGARH	3	0.24	6.09			2	67			1	33							3	100	0		0	0
32	WEST	PATEL NAGAR	3	2.5	5.51					1	33	2	67							3	100	0		0	0
33	WEST	PUNJABI BAGH	4	0.17	2.09			3	75	1	25		0							4	100	0		0	0
34	WEST	RAJOURI GARDEN	2		0.7		0.48	1	100		0		0	1	100					1	50	1	50	0	0
Total			74					28		14		14		7		4		6		56		17		1	

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