

CHAPTER - 1

INTRODUCTION

1.1 ORIGIN OF THE SYSTEM

The Upper Ganga Canal (UGC) system commissioned as far back as 1854-55 has its origin from the mythological Ganga. The Ganga rises in the Gangotri glacier in the Himalayas at an altitude of 7010 M above mean sea level in the Uttarkashi district of Uttaranchal. The river is called Bhagirathi at its source. Descending down the valley it is joined by the Alaknanda at Dev Prayag; the Bhagirathi Kharak and Satopanth. Below confluence with Alakananda, river is called the Ganga. Cascading approximately 160 km and cutting through the Shivalik range of hills it emerges into the plains at Haridwar.

The Ganga basin extends over an area of 107,331 sq.km and area in erstwhile Uttar Pradesh was 71302 sq.km. The catchment area upto Bhimgoda site from where the Upper Ganga Canal takes off is 25.28 lakh hectares.

Annual run off at Raiwala (75% availability) is minimum 169 cumecs & maximum 2086 cumecs.

1.2 HISTORICAL BACKGROUND

Upper Ganga Canal - The construction of Upper Ganga Canal was conceived & constructed by Proby T. Cautley during the period 1840-1854. In the beginning one of the branches of river - a natural channel flowing near Haridwar - was made use of to divert practically the entire winter flow by construction of temporary obstructions across other branches.

Mr. Proby.T.Cautley designed and constructed a versatile network incorporating almost all types of engineering cross-drainage marvels & regulating structures. He has been affectionately remembered as a British Engineer with an Indian heart. This arrangement continued to work for almost fifty long years. With increase in demand, the state took up construction of a permanent headworks in 1913 and completed it in 1920. It consisted of a weir about 550 m long fitted with 1.8 m high falling shutters & located about 3 km upstream of old regulator. The UGC system then comprised 910 km of main canal and branches and 5280 km of distributaries to provide irrigation facilities in the district of Saharanpur, Muzaffarnagar, Meerut, Bulandshaher & Aligarh; total area irrigated annually being 0.7 million hectares. The index map showing districts in UGC command is given at Dwg. 1.1. Photographs taken at selected sites are shown in Fig. 1 to Fig. 9.

The Upper Ganga Canal takes off from the right flank of Bhimgoda barrage which replaced the old weir at Haridwar in 1991-92. The canal with a head discharge of 190 cumecs (6750 cusecs) presently provides irrigation in a gross command area of about 20 lakh ha. in 10 districts of Western Uttar Pradesh. There are 4 major cross drainage works in initial 36 kms of the main canal. In the revised proposal, the canal has to carry an increased discharge of 295 cumecs (10419 cusecs). The maximum capacity of the canal in head reaches is proposed to be as 370 cumecs (13068 cusecs) which includes 20% extra inflow for silt ejector. The 4 cross drainage works located on the old canal are more than a century old and have outlived their lives. As such the Upper Ganga Irrigation Modernisation Project proposes to modernize the Upper Ganga Canal System in 4 phases in a time span of 40 years.

The first time slice of phase- I proposes to construct a parallel lined canal (Parallel Upper Ganga Canal) of 295 cumecs capacity beyond silt ejector

from 6 to 36 km and 177.5 to 240 km, 4 new cross drainage works on the Parallel Upper Ganga Canal (PUGC) namely Ranipur Syphon, Pathri Super Passage, Ratmau Aqueduct and Solani Aqueduct ; modernization of 3 distributaries (Dy.) namely Bulandshahar Dy., Harduaganj Dy. & Machhua Dy. in the districts of Bulandshahar and Aligarh and other related works. The project will also provide an additional potential of 9000 ha in the districts of Aligarh and Bulandshahar.

1.3 MADHYA GANGA IRRIGATION PROJECT

The Madhya Ganga Canal project was formulated for utilization of surplus monsoon waters of the Ganga during Kharif for development of paddy cultivation in the two dry pockets between Anupshahr branch & Upper Ganga Canal and between Upper Ganga Canal & Karwan Nadi in the lower command of Upper Ganga Canal. The project envisages construction of a barrage across the Ganga near Bijnour, Main Madhya Ganga Canal off- taking from the right bank and terminating in the Upper Ganga Canal, Lakhaoti branch with its distribution system, Mat branch feeder with its distribution system, Amarpur Dy. with its distribution system, Parallel Mat branch and Parallel Hathras branch Canal and remodeling of existing Mat, Hathras and Anupshahr branch canals of Upper Ganga Canal System.

The project will provide annual irrigation to 178 thousand ha. of which 64 thousand ha. will be in the new command areas of Ghaziabad, Bulandshahar & Aligarh districts and balance in the existing command of Upper Ganga Canal in the districts of Saharanpur, Muzaffarnagar, Meerut, Ghaziabad, Bulandshahar, Aligarh, Mathura, Agra, Etah & Mainpuri in the western part of Ganga-Yamuna Doab.. The project was taken up for execution in 1977 and was targeted for completion by December 2000. The revised schedule of completion is by 2002-03.

Upper Ganga Canal is comprised of about 7000 k.m. of canal network of branches, distributaries & minors to deliver water for irrigation, canal - based drinking water supply and for other miscellaneous usage. (Dwg.1.2)

1.4 UPPER GANGA CANAL SYSTEM

The main branches are : -

1. Deoband branch
2. Anupshahar branch
3. Mat branch
4. Hathras branch; taking off from Mat branch.

U.G.C. in its tail portion or a channel taking off near tail of UGC is called supply channel & has existing capacity of 15.49 cumecs.

Unlike Western Jamuna Canal (W.J.C.) where the distribution network has been designed and constructed for a very large C.C.A. both on the main W.J.C. command & projects like JLN, Loharu & Jui Lift Irrigation Systems and supplies available during lean months of winter are a fraction of total requirement necessitating four major groups & internal grouping to receive supply during first preference turn; the Upper Ganga Canal System has a comparatively better availability of supplies. Against capacity of around 311.52 cumecs at head in Parallel Upper Ganga Canal (PUGC) proposed to be supplemented with discharge of over 56.64 cumecs from augmentation tubewells (ATW) & allowing for losses supplies available even during lean months are more than half the total requirement. The full supply capacity of the system including designed discharge of ATWs would work out to around 368.16 cumecs whereas capacity of offtaking channels is 437.96 cumecs which is likely to enhance gradually with system improvement & modernisation. Even with availability of full supply

discharge, pro-rata discharge for distribution thus works out to about 84%. The capacity of offtake & distribution network exceeds 453.12 cumecs whereas capacity of conveyance system including augmentation tubewells is limited to around 368.16 cumecs. This is under conditions of better availability as such rotational running is necessary. But existing scenario of wanting maintenance, lack of control on unauthorised acts can be replaced with better water management & strict enforcement for resetting of canal system in order.

1.5 NEW OKHLA BARRAGE

Salient Features

Pond Level	201.35 M
Width of River	445.73 M
Length of Barrage	552 M
No. of Under Sluice Bays	5
No. of Barrage Bays	22
Width of under sluice bays	18.3 M each
Width of barrage bays	18.3 M each
Thickness of intermediate piers	2.13 M

Gates

- a. Number 27
 b. Size for under sluices 5 of 18.3 x 6 m each
 for other 22 of 18.3 x 5.1 m each

Sediment excluder device high excluder
 Length of U/s divide wall 85.42 M
 Ruggry dissipataction array Baffle blocks & dentated sills

Canal Head Regulator

Width of head regulator 80.57 M
 Width of bays 7.65 M each
 Thickness of piers 1.5 M each

Orientation w.e.f. barrage Axis 100
 Location of head regulator from barrage 22.25 m W/s
 Right bank

Max. discharge of canal - 242.4 cumecs

1.6 ALLOCATION OF WATERS

1.6.1 Criteria for Distribution of Supplies

The sharing of water from river Ganga is done as per standing orders issued by C.E. incharge & it lays down the principles for inter-circle and inter-divisional distribution of water in U.G.C. Command.

1.6.2 Procedure for Distribution of Water

On the U.G.C. Command, Chief Engineer (Upper Ganga Canal) Meerut, convenes a meeting of all the superintending engineers before the start of Rabi season to assess & decide probable availability of water for utilization in UGC & makes weekly allocations to each circle incharge who in turn decides the plan of operation of branches / distributaries & minors under his charge.

Computations for allotment of water during Kharif for each division are also done. Typical procedure adopted is shown at Annex 1.4 and 1.5. Releases are however subject to changes depending upon actual river flows available on weekly basis and quantities released in excess or short are adjusted in the next week or subsequent week.

The main line conveyance losses including those in branches are also spread out canal division justification-wise for the periods I, II & III and the % age share of each division in the available waters of U.G.C. is decided: typical example are as below :

1.6.3 Share of Various Canal Division of U.G.C. During Kharif

Percentage share during Kharif (Typical example)

Name of Division	Period I (1/4 to 19/5)	Period II (20/5 to 17/6)	Period III (18/6 to start of Monsoons)
1. Muzaffarnager Div.	32.8	25.1	25.9
2. Anupshahar Branch Divn. Meerut	16.8	14.8	14.6
3. Anupshahar Branch Narora Divn.	1.7	3.9	3.6
4. Meerut Div.	21.9	17.2	17.0
5. Bulandshahr Div.	6.7	8.9	8.9
6. Mat Branch - Div.	10.9	16.3	14.6
7. Aligarh Div.	9.2	13.8	15.4

Typical assessment for Rabi have similarly been shown at Annex. 1.1 & 1.3.

Daily account of supplies received & due are done & this has been shown in Annex. 1.2.

In case of Rabi crop season; the mainline losses (31.15 Cumecs) & supplies delivered to Delhi Water Supply undertaking are deducted at source for the share of U.G.C. available at Dhanauri.

The conveyance losses in the branches & supply channels are however incorporated in the shares of each division.

1.6.4 Share of Various Divisions of UGC during Rabi

(Typical example)

S.No.	Name of Division	% of Share
1.	Muzaffar Nagar*	16.0
2.	AB Divn. Meerut**	12.0
3.	AB Narora	5.40
4.	Meerut	9.5
5.	Bulandshahar Division	9.8
6.	Mat Branch Division	30.0
7.	Aligarh Division ***	17.3

* Line Diagram of canal system (Dwg. 1.4) enclosed

** Line Diagram of canal system (Dwg. 1.3) enclosed

*** Line Diagram of canal system (Dwg. 1.5) enclosed

The Divisional Officer / Executive Engineer prepares a roster of running different distributaries & minors in his division as soon as he knows his anticipated share. He prepares the roster in consultation with deptt. of Agriculture & horticulture etc. so that equitable distribution of releases is made in keeping with requirement of adopted cropping pattern.

1.7 PROJECT PARAMETERS

1.7.1 Landmarks

Date of commissioning of UGC	8/4/1854
Date of start of canal irrigation	1/5/1855
Ist remodelling done in	1868
Osrabandi System Started	1880

Remodelling of Capacity

Remodelling & increase in capacity

at head from 191.16 cumecs to 240.72 cumecs	1932
Increase in capacity from 240.72 cumecs to 29736 cumecs	1951-52
Construction of new headworks i.e. Bhimgoda Barrage	1978-84

1.7.2 Modernisation of UGC System

This first time slice includes replacement of 4 major cross drainage works on main canal; lining of canal connecting the existing system from 6 KM to 36 km & 100% modernisation in lower reaches. A detailed map showing Upper Ganga Irrigation Modernisation Project is given at Dwg. 1.2.

1.7.3 Command Areas

Initial gross command area	15 lakhs acres (6.07 lakh ha)
Present gross command area	50 lakhs acres (20.23lakh ha)
Present culturable area	25 lakhs acres (10.11 lakh ha)
Initial length of canal & branches in system	1412 Km(878 miles)
Total present length & branches in system	6540 Km

1.7.4 Salient Control Points & Crossings

Head regulator for Parallel Upper Ganga Canal	6.04 Km
Dhanauri Regulator	19.288 Km of UGC
Silt ejector	20.14 Km
Ranipur Rao xing (Syphon)	8.20 Km
Pathri Rao xing (Superpassage)	15.65 Km
Rat mau Rao (Aqueduct)	20.313 - 20.562 Km
Solani River (Aqueduct)	28.748-29.110
Common reach of UGC & Parallel Upper Ganga Canal	29.4 to 30.6 Km

1.7.5 Alignment of UGC

U.G.C. flows almost North to South in head reach till Janli where Anupshahar branch takes off; hereafter it takes South-West direction.

1.8 GEOMORPHOLOGY

The U.G.C. in its upper reach caters to the irrigation requirement of Muzaffarnagar district, which lies in the Doab of Ganga & Yamuna river between North Latitude $29^{\circ} 1.0'-50''$ and $29^{\circ} 44'20''$ & east longitude $77^{\circ} 02'$ to $78^{\circ} 7'$ (area 4049 sq. km)

Terrain is flat; general slope is towards south; (0.4 m / Km); highest elevation 261.0 & lowest 222.0 Meter above MSL.

This can be divided into five geomorphic units.

- i) Sand Bar
Along the Ganga river with occasional changes due to floods.
- ii) Flood Plains
Flat, low lying, poorly drained features
- iii) Ravines : Occur in western part in the form of gullies along rivers Kali Hindon & Krishni as a result of localised surface runoff eroding the unconsolidated soils.
- iv) Young alluvial plain between western bank of Ganga & Eastern bank of Yamuna. Gentle slope, presence of Ox-bows, Khadir area. The Ganga Khadir is 20 km wide in North which dwindles to 2km width in the vicinity of Bhukarhen.
- v) Old Alluvial Plain
 - a) Tract between Ganga & Kali river
 - b) Between Hindon & Kali river
 - c) Between Hindon & Yamuna River
- vi) Lithology and Ground Water Aquifer
Study of lithological logs reveal that rough nature of alluvial sediment is complex & there is quick alternation of fine to coarse sediments; by & large four distinct permeable layers occur down to 450 m.

3-24 m is top sandy clay bed covering almost huge area. The first aquifer is encountered after top clay layer. Ist & IInd aquifer is separated by 10.15 M thick clay bands. The IInd aquifer occurs between 115-235 m below ground level Sedimentation of this aquifer are less course.

Hydrological studies in Bijnor and Saharanpur have been carried out in the Bhabar - Tarai belt and the adjoining Gangetic alluvial plains. In Bhabar Tarai belt ground water occurs under confined conditions. Large groundwater development is possible in Gangetic alluvium. Ground water occurs both under confined and unconfined conditions in the about lower reaches of U.G.C.

**PLANNING OF TENTATIVE ALLOCATIONS FOR UGC FOR RABI
(Sample Methodology)
1st Circle, Irrigation Works, Meerut**

Actual Supplies received at the head of UGC at Dhanauri, L.G.C. (excluding

Week Commencing	U.G.C.		L.G.C.		Agra Canal	
	Dhanauri		Inc. Ramganga	Excluding Ramganga		
	Received in previous Rabi	Assume d for Subsequ ent Rabi	Received in last Rabi	Asumed for Subsequen t Rabi	Received in last Rabi	Assumed for Subsequ ent Rabi
25.10	7978	8500	8346	7500	1988	1500
1.11	7563	8000	6270	5500	1528	1500
8.11	6980	7550	4562	4500	1645	1500
15.11	7550	7550	7050	3050	1250	1250
22.11	7400	7400	6450	2450	1540	1200
29.11	7067	7050	6075	2100	1630	1200
6.12	6597	6600	5795	2100	1518	1200
13.12	6515	6500	5780	2050	1325	1150
20.12	6010	6000	6020	2050	1135	1100
27.12	6205	6000	6040	2050	960	1100
3.10	6495	6000	6170	2050	1580	1100
10.10	5725	5700	6075	2050	1360	1000
17.10	5660	5600	5930	1900	1355	1000
24.10	5610	5600	5845	1900	1357	1000
31.10	4900	4900	5955	1900	995	900
7.02	5225	4900	5880	1850	685	700
14.2	4925	4900	5510	1500	1075	700
21.2	4881	4850	5267	1350	1275	700
28.2	4475	4450	5315	1300	990	650
7.3	4935	4450	4760	1100	1100	650
14.3	4725	4450	4181	1100	1055	650

DAILY WATER ACCOUNT FOR RELEASES COMMENCING 7/11

(Typical for a Year)

S.NO.	DETAIL	7/11	8/11	9/11	10/11	11/11	12/11	13/11	14/11	15/11	Total	Average including losses (cusecs)
1	2	3	4	5	6	7	8	9	10	11	12	
1	Corresponding Dhanauri Discharge	9005	9005	9333	9333	9333	9935	9935			65879	
2	(-) Discharge passed at Belra	7079	7707	7842	7976	7976	8043	7963			54586	9410
3	Co.. 1 - Col. 2	1926	1298	1491	1357	1357	1892	1972			11293	
4	below Belra Channels	415	415	415	415	322	415	415			2812	
5	D.C. Mzn Dn (Col. 3 + Col. 4)	2341	1713	1906	1772	1679	2307	2387			14105	
1	Below Belra Channels	415	415	415	415	322	415	415			2812	
2	Discharge passed into A.B	1650	1650	1650	1650	1650	1650	1650			11550	1650
3	Discharge passed into Khatauli Escape	0	0	0	0	0	0	0			0	
4	Discharge passed at Newari Down	3898	3419	3741	4220	4524	4742	4916			29460	
5	Corresponding Discharge received at Beilra	7479	7707	7842	7976	7976	8043	7963			54986	
6	Total Col. 1+2+3+4	5963	5484	5806	6285	6496	6807	6981			43822	
7	D.C. Meerut Dn (Col 5 - Col. 6)	1516	2223	2036	1691	1480	1236	982			11164	1595
1	Discharge passed into Mat Br			498	1000	1582	1534	1534	1680	1701	9529	1362
2	Delhi Supply			150	150	150	150	150	150	150	1050	150
3	Discharge passed at Walipura down			2073	1154	1154	1702	1819	1819	1575	11296	1615
4	Corresponding discharge received at Newari			3898	3419	3741	4220	4524	4742	4916	29460	
5	Total Col. 1+2+3			2721	2304	2886	3386	3503	3469	3426	29460	
6	D.C. Bul Dn. (Col 4 - Col 5)			1177	1115	855	834	1021	1693	1490	29460	t

TENTATIVE ROSTER FOR RABI

Pre-Kor Period (6 weeks)

Cusec Weeks

S. No.	Detail	W/C						Share	
		24.10	31.10	7.11	14.11	21.11	28.11	Given	Due
1	Muzaffarnagar Dn. G.C.	600	650	850	1150	850	1000	5100	4050
2	A.B. (MT) Division	800	600	850	750	800	-	3800	3045
3	A.B. (Narora) Dn.	400	400	300	300	350	-	1750	1375
4	Meerut Dn. G.C.	500	350	650	-	800	700	3000	2405
5	Bulandshahr Dn. G.C.	800	400	-	900	600	400	3100	2480
6	Mat Branch	1600	1600	1400	1500	1600	1700	9400	7580
7	Aligarh (D) Circle	1500	1100	600	1450	500	350	5500	4375
8	Khatauli / Jani Escape for Agra Canal	500	600	600	200	600	600	3100	3390
9	Kanpur Stump for LGC	500	1000	1000	-	-	1000	3500	10650
10	Delhi Supply	200	200	200	200	200	200	1200	1200
11	Main Line Losses	1100	1100	1100	1100	1100	1100	6600	6600
12	Dhanauri Discharge	8500	8000	7550	7550	7400	7050	46050	46050

TENTATIVE ROSTER FOR RABI

Pre-Kor Period (9 weeks)

Cusec Weeks

S. No.	Detail	W/C									Share	
		5.12	12.12	19.12	26.12	2.1	9.1	16.1	23.1	30.1	16.10	23.1
1	Muzaffarnagar Dn. G.C.	400	700	700	700	750	750	400	450	800	5650	5705
2	A.B. (MT) Division	800	700	-	700	700	-	700	700	-	4300	4295
3	A.B. (Narora) Dn.	350	300	-	350	300	-	350	300	-	1950	1915
4	Meerut Dn. G.C.	-	600	500	-	650	500	-	600	500	3350	3385
5	Bulandshahr Dn. G.C.	650	550	-	700	500	-	600	500	-	3500	3500
6	Mat Branch	1200	1200	1450	1000	1200	1200	1000	1200	1200	10650	10705
7	Aligarh (D) Circle	800	550	1450	650	-	1350	700	-	600	6100	6175
8	Khatauli / Jani Escape for Agra Canal	600	600	600	600	600	600	550	550	500	5200	5205
9	Kanpur Stump for LGC	500	-	-	-	-	-	-	-	-	500	315
10	Delhi Supply	200	200	200	200	200	200	200	200	200	1800	1800
11	Main Line Losses	1100	1100	1100	1100	1100	1100	1100	1100	1100	9900	9900
12	Dhanauri Discharge	6600	6500	6000	6000	6000	5700	5600	5600	4900	52900	52900

TENTATIVE ALLOTMENT FOR KHARIF (SAMPLE)

Sharing Calculation based on C.E.'s O.M. No. 3662/W-1/79, dated August 7, 1979

S.No.	Detail	Ist Period		IIRD Period		IIIRD Period		
		30/3 to 17/5 (7 weeks)		8/5 to 14/6 (4 weeks)		15/6 to 23/8	24/8 to 25/10	
1	2	3	4	5	6	7	8	9
1	UGC Dis. At Dhanauri (S)		56100		38000		9000	85500
2	(-) Delhi Supply @ 200 cs - week		-1400		-800		-2000	-1800
3	Col. 1 - Col. 2 Net (S)		54700		37200		93000	83700
4	Agra Canal Dis (F)		5400		2050			
5	Total S + F		60100		39250			
6	(-) Losses Jani Esp. @ 200 cs - week (A)		-1400		-800			
7	Total S + F - A		58700		38458			
8	L.G.C. +P.L.G.C. Supply (N)		20230		33350			
9	Total S+F+N-A		78930		71800			
10	Share U.G.C. @ (of Col. 9)	64.10%	-	56.30%	-	44.70%		Due share
11	Share LGC @ (of col. 9)	24.40%	19259	33.30%	23910	47.70%		1170
12	Agra Canal @ (of Col. 9)	11.50%	Share	10.40%	Share	7.40%		
13	IF THERE IS NO SHARE OF LGC							
14	Share UGC @ (Col. 7)	85%	49895	84%	32300	86%	90770	
15	Share Agra Canal @ (Col. 7)	15%	8805	16%	6150	14%	-	
16	Due share Agra Canal (Col. 15-4) + losses Jani Escape @ 200 cs		4805		4900		2230	730
17	UGC Share (including losses) Col.14		49895		32300		90700	81800
	1) Share MZN Dn.	32.80%	16365	25.10%	8110	25.90%	23500	21186
	2) Share A.B. (MT) Dn.	16.80%	8380	14.80%	4780	14.60%	13250	11943
	3) Share A.B. (NRA) Dn.	1.79%	850	3.90%	1260	3.60%	3260	2945
	4) Share Meerut Dn.	21.90%	10925	17.20%	5555	17.00%	15430	13906
	5) Share Meerut Dn.	6.79%	15	8.90%	2875	8.90%	8080	7280
	6) Mat Br. Dn.	10.90%	5440	16.30%	5265	14.60%	13250	11943
	7) Share Aligarh Dn.	9.20%	4590	13.80%	4455	15.40%	14000	12597

PLANNING OF TENTATIVE ALLOCATIONS FOR UGC FOR KHARIF BASED ON 75% AVAILABILITY

(Share including losses)

Typical Sample methodology

(Cusecs Weeks)

No.	Detail	W/C		Ist Period				(7 weeks)				Share		IInd Period (4 weeks)				Share	
		31.3	6.4	13.4	20.4	27.4	4.5	11.5	Given	Due	18.5	25.5	1.6	8.6	Given	Due			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
1	Muzaffarnagar Dn. G.C.	2000	1600	2000	2650	2650	2650	2650	16200	16365	2100	2000	2000	2000	8100	8110			
2	A.B. (MT) Division	1000	1000	800	1500	1400	1350	1600	8650	8380	1200	1200	1000	1200	4800	4780			
3	A.B. (Narora) Dn.	200	200	0	0	250	200	0	850	850	300	300	300	350	1250	1260			
4	Meerut Dn. G.C.	1550	1200	1100	1750	1750	1750	1700	10800	10925	1300	1500	1400	1350	5550	5555			
5	Bulandshahr Dn. G.C.	150	400	650	500	700	500	450	3350	3345	800	600	700	800	2960	2875			
6	Mat Branch	0	1000	1000	0	1200	1200	1050	5450	5440	1300	1350	1400	1200	5250	5265			
7	Aligarh (D) Circle	700	250	750	800	250	800	1050	400	4590	1100	1150	1100	1100	4450	4455			
8	Khatauli / Jani Escape for Agra Canal	500	450	500	600	1100	850	800	4800	4805	1200	1200	1200	1300	4900	4900			
9	Kanpur Stump for LGC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
10	Delhi Supply	200	200	200	200	200	200	200	1400	1400	200	200	200	200	800	800			
11	Dhanauri Discharge	6300	6300	7000	8000	9500	9500	9500	56100	56100	9500	9500	9500	9500	38000	38000			