REPORT ON
PILOT CENSUS OF UPPER GANGA CANAL IRRIGATION PROJECT

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ABBREVIATIONS

AFC	AFC India Limited
BRGF	Backward Regions Grant Fund
CAD WM	Command Area Development and Water Management
CCA	Culturable Command Area
Cumec	Cubic meter per second
Cusec	Cubic feet per second
CWC	Central Water Commission
Dn	Division
DPR	Detailed Project Report
DSS	Data Storage System
Dy	Distributory
E	East
ERM	Extension, Renovation and Modernisation
FRL	Full Reservoir Level
GPS	Global Positioning System
Ha, ha	Hectare
IPC	Irrigation Potential Created
IPU	Irrigation Potential Utilized
km	Kilometer
KML	Keyhole Markup Language
L	Left
Lat.	Latitude
LBC	Left Bank Canal
LBMC	Left Bank Main Canal
Long.	Longitude
m	Meter
m^3	Cubic meter
MCM	Million Cubic Meter
MDDL	Minimum Draw Down Level
MMI	Major and Medium Irrigation Projects
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
Mr	Minor
MW	Megawatts
N	North

NCR	National Capital Region
O & M	Operations and Maintenance
PIM	Participatory Irrigation Management
PSU	Public Sector Units
R	Right
RBC	Right Bank Canal
RBMC	Right Bank Main Canal
RD	Reduced Distance/ Chainage
RFP	Request For Proposal
RL	Reduced Level
SDy	Subdistributory
SLD	Single Line Diagram
SMr	Subminor
Sq. km	Square Kilometer
TAC	Technical Appraisal Committee
UGC	Upper Ganga Canal
UIP	Ultimate Irrigation Potential
WUA	Water Users Association

DEFINITIONS OF TERMS USED IN THE REPORT

AGRICULTURE

Cash Crops

A high value marketable crop such as sugarcane, jute, spices, fruits, tobacco and plantation crops.

Cropping intensity

The percentage of the total crop area during a crop year or season to the culturable command area.

Cropping Pattern

Yearly sequence and spacious arrangement of the crops in a given area.

Gross Cropped Area (GCA) (or Cropped Area)

Gross cropped area is the total cropped area under various crops during the whole agricultural year counting the area as many times as the number of crops grown on the same land. Mixed crops sown simultaneously on the same land are treated as one crop.

Kharif crops

Those crops which are cultivated in the monsoon season. The following are the principal kharif crops: Maize, rice, small millets, peas, groundnut, cotton, tobacco, and sesame.

Mixed Crop

Where more than one crop is raised on the same field in the same season simultaneously, without any definite row arrangement such as gram and wheat.

Net Cropped Area (Net Area Sown)

Net cropped area is the area sown (or cropped) during the agricultural season (July-June), counting the area only once even if two or more crops are grown in different seasons on the same land.

Perennial crops

Crops which last several crop years like plantation or orchard crops.

Rabi Crops

Those crops which are cultivated in the winter season. The following are the principal Rabi crops: Wheat, barley, gram, peas, potatoes, mustard, tobacco and linseed.

Summer Crop

Often represents an intermediate (third) crop between the Rabi and Kharif crops.

HYDRAULIC STRUCTURES

Barrage

A structure built across a river, for diverting water into a canal or for providing a small storage pond. It comprises a series of gates for regulating the river flow and water level, while keeping the afflux during floods within, acceptable limits. The structure may or may not have a raised sill. It is constructed to regulate the water-surface level and to divert the water flow from upstream of the gates.

Composite Dam

A concrete/masonry wall with rockfill or earth-backing in downstream.

Lining

A protective covering (over entire or portion of the perimeter) of a water conductor system or reservoir to reduce seepage losses, to withstand pressure, to reduce and prevent erosion and improve conditions of flow.

Pond Level

The level of water immediately upstream of a structure required to facilitate withdrawal into the canal or for any other purpose.

Sill

a) A structure built under water across deep pools of a river course for counteractingthe tendency to excessive scour.

b) A structure built at the outlet of a channel where certain minimum depth offlow is to be maintained in the channel, or a structure built at the head of a channel to prevent flow entering the channel until the main river stage reaches the crest of the structure.

c) The invert of a gate or sluice opening.

Under Sluices

The under sluices are bays in continuation of the weir with a crest at lower level on the same side as the canal to maintain a clear and well defined rives channel towards the canal head regulator, to scour the silt deposlted on the river bed in the pocket upstream of canal head regulator or to pass winter freshness and low floods without dropping the weir shutters.

Weir or Anicut

An ungated barrier across a stream or a river for the purpose of:

a) measuring its discharge, or

b) raising, controlling and maintaining the water level, and/or,

c) diverting part or all the water from the stream/river into a canal or conduit.

Run-of-the River Power Station

A power station utilizing the run-of-the river flows for generation of power with sufficient pondage for supplying water for meeting diurnal or weekly fluctuations of demand. In such stations, the normal course of the river is not materially altered.

IRRIGATION

Classification of Irrigation Projects

The irrigation projects can be classified as:

i. Major Irrigation Scheme - Culturable Command Area (CCA) more than 10,000 hectare (ha)

ii. Medium Irrigation Scheme- Culturable Command Area (CCA) more than 2000 hectare (ha) and upto 10,000 hectare (ha)

iii. Minor Irrigation Scheme - Culturable Command Area (CCA) up to 2000 hectare (ha)

Closure period

The period when the canal is closed for regular maintenance, repairs and other purposes.

Consumptive Use Efficiency

The ratio of consumptive water use by crop and the soil moisture stored in the root zone of the soil during the crop growth period.

Conveyance

The movement of water from its source through the main or secondary canals or conduits to the tertiary or distributary off-takes.

Conveyance Losses or Transmission Losses

Losses of water in transit from the source of supply to the point of field turn out whether in natural channels or in artificial ones, such as canals, distributaries or watercourses. They comprise evaporation from the water surface, seepage and incidental transpiration by vegetation growing in or along the canals network. These also include the operation losses in the canal system.

Crop Water Requirement

The total water needed for evapo-transpiration from planting to harvest for a given crop in a specific climate regime, when adequate soil water is maintained, by rainfall and/or irrigation so that it does not limit plant growth or crop yield.

Culturable Command Area

It is the area which can be physically irrigated from the scheme and is fit for cultivation **or** the difference between the gross command area and the unculturable area falling under the command **or** Total area in which cultivation is possible.

Distributary or Tertiary

Canal or conduit taking water from the con-veyance system and supply it to one tertiary unit.

Diversion Structure

The structure that diverts water from the water sources and supplies it to the irrigation system.

Drip/Trickle Irrigation

It comprises the application of water in drops close to the plant. The entire space between the plants is not watered.

Field Channel

Channel usually taking water from the watercourse and supplying it to one or more forms or fields.

Field Irrigation Requirements

The requirements of irrigation water for crops at the diversion point of supply channel.

Flow Irrigated Area

Area which can be irrigated from the source of water by flow under gravity alone.

Gross Command Area

The total geographical area which can normally be commanded or serviced from a irrigation project without consideration of water supplies available for irrigation. It is the total area covered by an irrigation project including unculturable area under habitation, road, tanks, waste land, forest land etc.

Gross Irrigated Area

The gross irrigated area is the total irrigated area under various crops during the whole agricultural year, counting the area irrigated under more than one crop during the same year as many times as the number of crops grown. Inter-cultured or mixed crops are treated as one crop.

Irrigation

The supply of water by artificial means for raising crops.

Irrigated Area

The area to which irrigation water has been applied.

Irrigation Potential Created - (As per Planning Commission)

a. The irrigation potential created by a project at a given time during or after its construction is the aggregate gross area that can be irrigated annually by the quantity of water that could be made available by all connected and completed works upto the end of the water courses or the last point in the water delivery system upto which the Government is responsible for construction.

b. Before an area is included and reported under 'Potential Created', it may be ensured that the storage, head-works as well as the distribution system including irrigation outlets to serve the area are completed together with necessary water courses covering chaks or blocks upto 40 hectares in area and that works completed will make available the requisite water for the purpose in a design year for the assumed cropping pattern. The irrigation outlets should be of a capacity of about 0.03 cumec. The capacity may, however, vary depending on local conditions relating to topography, crop pattern, etc. but it should not normally exceed 0.06 cumec. The figures of the potential which relate to the gross

irrigated 'new area' and 'old area stabilized' should be reported separately. The potential which refers to the 'old areas stabilized' should, however, not be considered as adding to the total irrigation potential created since this area would have already counted earlier once.

Irrigation Potential Utilized - (As per Planning Commission)

a. The irrigation potential utilized is the total gross area actually irrigated by a project during the year under consideration. The figures relating to the stabilization of 'old area' should be furnished separately in this case also since these will not be additive to the gross area irrigated.

b. As, generally, the utilization of irrigation potential created can take place only in the year following the creation of such potential, it will be appropriate if the irrigation potential utilized in a particular year is considered with the potential created upto the end of the preceding year for the purpose of comparison.

Irrigation System

It includes storage and diversion structure, main canal, distributory, minors, water courses, field channels, and allied structures including head regulator, cross drainage works and control structures.

Irrigation Water Requirement

The amount of crop water requirement that is not provided by effective rainfall, utilization of stored soil moisture or upward flow of water to the root zone from a saturated zone.

Rostering of Channels

It is the sequencing of water delivery in different channels as a part of regulation.

Surface Irrigation

Method of irrigation where the water flows on to the field surface by gravity from the head to the tail end.

Surface Irrigation Method

It is the application of water by surface method such as wild flooding, border strip, check basis, and furrows for raising crops.

Ultimate Irrigation Potential -(As per Planning Commission)

i. It is the gross area that can be irrigated from a project in a design year for the projected cropping pattern and assumed water allowance on its full development. The gross irrigated area will be aggregate of the areas irrigated in different crop seasons**, the areas under two-seasonal and perennial crops being counted only once in the year.**

ii. The following considerations have to be taken into account in estimating the ultimate irrigation potential expected from a project in terms of area:

a) It will not be correct to assume the culturable command area as an arbitrary percentage of the gross command area. The CCA should be assessed from actual and by consulting land records.

b) A part of the area being proposed to be brought under irrigation from a project may be already receiving irrigation from other sources, whether major, medium or minor irrigation works, which might have been commissioned earlier. The benefits from the new project may be by way of an additional water allowance to irrigation more secure or to stabilize irrigation the area. Such area should not be counted in new irrigation potential but considered only as stabilize of irrigation in an old area. The Ultimate irrigation potential should indicate only figures of gross irrigation of new area whether in the new command area or in the existing command (by increasing the intensity of cropping). The old area stabilized may be reported separately.

REPORT ON PILOT CENSUS OF UPPER GANGA CANAL IRRIGATION PROJECT

1. Background

1.1 The growing gap between Irrigation Potential Created (IPC) and that Utilized (IPU) is becoming a matter of great concern. Though there exists a gap between IPC and IPU, which need to be bridged, but often this gap gets over-estimated since the same command area is counted as potential created under surface water major/medium project and again under supplementary minor project (surface lift/ groundwater project). To assess the actual scenario of irrigation in the country, CWC considered necessary to undertake a census of completed major and medium irrigation projects to collect the following information:

a. Culturable Command Area (CCA) and their geographical extent

b. Irrigated area by season

c. Irrigation Potential created and utilized (IPC & IPU)

d. Cropping pattern

e. Other project related information

1.2 CWC has decided to take up the pilot census for standardizing the methodology for the main census of MMI projects by taking one project (major or medium) from each of different regions namely North, South, East, West, North-West, South-East, South-West & Central. As such about 8 projects would be covered in the pilot census. The Pilot Census is to be covered in two phases described as below:

Phase-I: Collection of data pertaining to inventory detail of 8 selected projects from project authorities.

Phase-II: Collection of data through outsourcing up to outlet level (i.e. data on utilization part) of the 8 projects covered in the Phase-I.

1.3 CWC has selected 8 projects covered in the Phase-I for collecting inventory-details. The list of 8 selected projects is given in Table 1 below:

Table 1 List of Selected Projects for Pilot Census Survey

S. No.	Name of Project	Type (Major/Medium)	Region	State
1	Upper Ganga Canal	Major	North	Uttar Pradesh
2	Sethiathope Anicut System	Major	South	Tamilnadu
3	Mangalam	Medium	South	Kerala
4	Midnapur Canal	Major	East	West Bengal
5	Damanganga	Major	West	Gujarat
6	Fulzar-I	Medium	West	Gujarat
7	Pairi	Major	Central	Chhattisgarh
8	Sukla	Major	North-East	Assam

1.4 The data pertaining to inventory details has been collected by CWC in a prescribed schedule while executing Phase – I of the Pilot Census.

1.5 CWC has called for expression of Interest in January 2016 and AFC India Limited (AFC) has expressed its interest to carry out the proposed phase- II of pilot census of selected Major and Medium irrigation projects. Thereafter CWC issued the RFP in April 2016 and AFC submitted its offer online on 5th May 2016 for the 8 selected projects. CWC has awarded the assignment of conducting Census survey for the following five projects to AFC.

Table 2 List of Projects Allocated to AFC India Limited

S. No.	Name of Project	Type (Major/ Medium)	Region	State
1	Upper Ganga Canal	Major	North	Uttar Pradesh
2	Midnapur Canal	Major	East	West Bengal
3	Fulzar-I	Medium	West	Gujarat

4	Pairi	Major	Central	Chhattisgarh
5	Sukla	Major	North-East	Assam

1.1 Later CWC decided to award the assignment of conducting Census survey for another two projects viz., Mangalam Medium Irrigation Project in Kerala and Sethiatope Anicut system in Tamilnadu to AFC.

2. Scope of Work

2.1 AFC has carried out a comprehensive and critical review of the existing irrigation scenario in the field with the following scope of work.

i. To identify the gaps as reported by project-authorities in each project.

ii. To assess the reasons of reported gaps.

iii. To diagnose the constraints and difficulties if any in achieving the targets of achieving IPC as envisaged.

iv. To suggest remedial measures for minimizing the identified gaps of IPC and IPU.

v. To suggest suitable methodology for carrying out the main census of major and medium irrigation projects in the country.

vi. To prepare a command area map including canals.

vii. To prepare Canal Network diagram with attributes attached and types of canal structures marked along with chainage. The output map will be given in *.pdf and *.kml form.

3. Objectives

3.1 The main objectives of this study are as follows:

i. To develop a command area map including canals;

ii. To develop Canal Network Diagram up to outlet level;

iii. To identify the gap between IPC and IPU.

iv. To suggest remedial measures to bridge the gap between IPC and IPU.

4. Project Details

4.1 Upper Ganga Canal Irrigation project is located in western and north western Uttar Pradesh. This project is covering 1 district of Uttaranchal and 15 districts of Western U.P. viz., Haridwar, Saharanpur, Muzaffarnagar, Meerut, Baghpat, Hapur, Ghaziabad, Gautam Budh Nagar, Aligarh, Bulandshahr, Mathura, Hathras (Mahamaya Nagar), Kanshiram Nagar, Agra, Ferozabad and Etah. The location of the project is shown in **Fig. 1.**

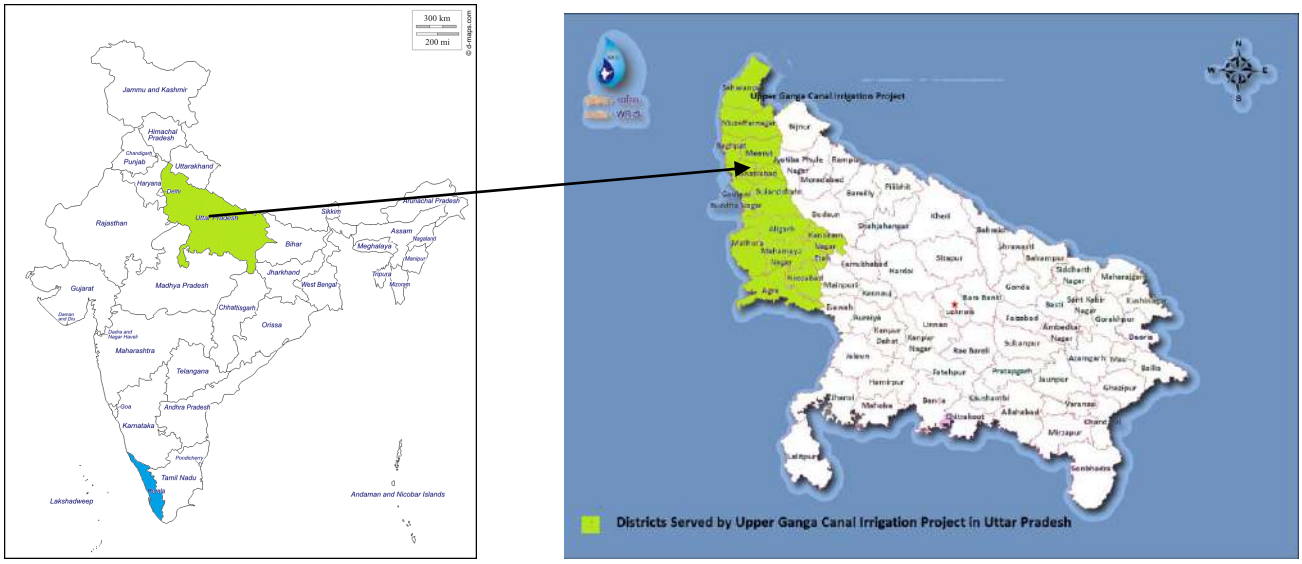


Fig. 1 Location of Upper Ganga Canal Irrigation Project

4.2 Profile of Districts Served by Upper Ganga Canal Project

4.2.1 District Haridwar

Haridwar is a district in the state of Uttarakhand, India. It is headquartered at Haridwar which is also its largest city. The district is ringed by the districts Dehradun in the north and east, Pauri Garhwal in the east and the Uttar Pradesh districts of Muzaffarnagar and Bijnor in the south and Saharanpur in the west. A paradise for nature lovers and one of the seven holiest places of Hinduism, Haridwar presents a kaleidoscope of Indian culture and civilisation.

Haridwar district came into existence on 28 December 1988 as part of Saharanpur Divisional Commissionery. On 24 September 1998 Uttar Pradesh Legislative

Assembly passed the 'Uttar Pradesh Reorganisation Bill, 1998', eventually the Parliament also passed the Indian Federal Legislation – 'Uttar Pradesh Reorganisation Act 2000', and thus on 9 November 2000, Haridwar became part of the newly formed Uttarakhand (then Uttaranchal), the 27th state in the Republic of India. As of 2011 it is the most populous district of Uttarakhand. Important towns in the district are Haridwar, Roorkee, Manglaur, Dhandera, Jhabrera, Laksar, Landhaura and Mohanpur Mohammadpur, BHEL Ranipur. Haridwara district, covering an area of about 2,360 km², is in the southwestern part of Uttarakhand state of India. Its latitude and longitude are 29.96-degree north and 78.16-degree east respectively. The river Ganges flows through it in a series of channels separated from each other called aits, most of which are well wooded. Other minor seasonal streams are Ranipur Rao, Pathri Rao, Rawii Rao, Harnaui Rao, Begam Nadi etc. The Ganges Canal was opened in 1854 after the work began in April 1842, prompted by the famine of 1837–38. The unique feature of the canal is the half-kilometre-long aqueduct over Solani river at Roorkee, which raises the canal 25 metres above the original river.

A large part of the district is forested. The wooded Rajaji National Park, a wildlife sanctuary, is within the bounds of the district and is accessible through different gates; Ranipur and Chilla Gates are just about 9 km from Haridwar. It is an ideal destination for wildlife and adventure lovers. Sureshvari Devi Mandir, a temple of Goddess Sureshwari, is situated in the midst of Rajaji National Park. Cheela Dam is a picnic spot with a dam and a man-made lake nearby; elephants and other wild animals could be easily spotted here. Neel Dhara Pakshi Vihar is a bird sanctuary, situated on the main Ganges river, or Neel Dhara, at the Bhimgoda Barrage; it is a paradise for bird watchers and home to many migratory birds during the winter season. Temperatures: Summers: 35 °C – 42 °C; Winters: 6 °C – 16.6 °C. The district receives monsoon rains, mostly during the summer.

According to the 2011 census Haridwar district has a population of 1,927,029. This gives it a ranking of 244th in India (out of a total of 640). The district has a population density of 817 inhabitants per square kilometre. Its population growth rate over the decade 2001–2011 was 33.16%. Haridwar has a sex ratio of 879 females for every

1000 males, and a literacy rate of 74.62%. The Haridwar district is ringed by Saharanpur in the west, Dehradun in the NW and N, Pauri Garhwal in the E, Muzaffarnagar in S and Bijnor in the SE. Prior to its inclusion in the newly created state of Uttarakhand in 2000, this district was a part of Saharanpur Divisional Commissionary. The district is administratively subdivided into three tehsils, viz., Haridwar, Roorkee, and Laksar. It is further divided into six development blocks, viz., Bhagwanpur, Roorkee, Narsan, Bahadrabad, Laksar, and Khanpur. The district headquarters is in Roshnabad, at a distance of about 12 km from Haridwar railway station. The office of Chief Development Officer is in Vikas Bhawan, Roshnabad. The Collectorate, Vikas Bhawan, District Judiciary, S.S.P. Office, Police line, District Jail, District sports stadium, Jawahar Navodaya Vidyalaya etc. are the prime establishments of this area. Many other administration offices like Lok Seva Ayog and Sanskrit Academy are established here.

Agriculture is the mainstay of this well irrigated district. Industrialisation had commenced with the establishment of Central Government owned Public Sector plants (PSUs) of Hindustan Antibiotics Limited and Bharat Heavy Electricals Limited, in pre-Uttarakhand 1960s period. The State Industrial Development Corporation of Uttarakhand (SIDCUL) has now established one new 'industrial development zone' in the district, adjacent to Shivalik Nagar near Haridwar, to encourage industrialisation; with industrial giants like Hindustan Lever, Dabur, Mahendra & Mahendra and Havells having moved in, it is making the desired progress. Not insignificant to the district's economy is the contribution of Hindu pilgrims who visit the holy places and attend the religious fairs in large numbers.

Haridwar district is well endowed with academic institutions of excellence, thanks mainly to the facilities of national fame available for studies in sciences, engineering, technology and advanced research in the town of Roorkee. Education in Sanskrit based classics and Hindu religious/cultural disciplines is an age-old tradition in the district, mainly centred in and around Haridwar city. National Highway 58, between Delhi and Mana Pass, passes through Haridwar. Indian Railways links Haridwar Railway Station to all parts of India. The nearest airport

is Jolly Grant Airport, Dehradun, though Indira Gandhi International Airport in New Delhi is preferred.

4.2.2 District Saharanpur

The entire Saharanpur district is a part the Yamuna-Ganges Doab region. Its physical features have been most conducive to human habitation. Archaeological surveys have provided evidence of the existence of many settlements over the ages. Excavations have been carried out in different parts of the district, such as Ambakheri, Bargaon, Hulas and Naseerpur and in Bahadrabad of Haridwar district. On the basis of artifacts discovered during these excavations, human habitation can be traced as far back as 2000 B.C. Traces of the Indus Valley civilization, and even of earlier cultures, have been found. Archaeologically, Ambakheri, Bargaon, Naseerpur and Hulas were centres of Harappan civilisation.

Saharanpur is located at 29.97°N 77.55°E,about 130 kilometres south-southeast from Chandigarh and 170 kilometres north-northeast from Delhi. It has an average elevation of 284 metres. Saharanpur forms the most northerly position of the land known as the Doab which stretches between the holy rivers of the Ganges and the Yamuna. The Shivalik hills rise above it on the northern frontier. The north and the north east of the district are surrounded by the Shivalik hills which separate it from the Dehradun district in the recently created state of Uttranchal. The river Yamuna forms its boundary in the west, separating it from the Karnal and Yamunanagar districts of Haryana. In the east lies the district of Haridwar which was part of the district of Saharanpur until 1989, and in the south lies the district of Muzafarnagar. The district is rectangular in shape and lies between 29^{o} 34’ 45” and 30^{o} 21’ 30” N Latitude and 77^{o} 9’ and 78^{o} 14’ 45” E Longitude.

The main characteristics of the district can be divided into four parts, viz., The Shivalik Hill Tract; The Bhabar Land, Bangar Land and Khadar Land (Yamuna, Hindon). Important Rivers are Yamuna, Solani, Hindon, Ratmau, Nagdev. All the rivers of the district flow into either the Yamuna or the Ganges. Saharanpur has a tropical climate because of the proximity of the Himalayan region across this Northern district. It is a sub humid region especially the upper Ganges plain areas.

June is the hottest recorded month while January is the coldest one. Humidity is higher in the western area as compared to the eastern region.

The district is part of a fertile belt. A well-developed irrigation system of Gangetic-canals and tube-wells supports a thriving agricultural economy of multiple crops and bumper yields. In addition to farming of major food grain crops like wheat, rice etc., cash crops like sugar cane and potatoes etc. are cultivated on a wide scale. Fruit orchards and horticulture are also important for local and export markets. Even though Dehradun is more famous for basmati rice, a lot of it is grown in the Saharanpur area.

From the view point of industries and trade the region has great importance. The district has several agro-based industries: paper, tobacco, wood-work etc. A multinational cigarette manufacturing company, the Indian Tobacco Company (ITC Limited), is located in Saharanpur. The region produces agro-based and industrial goods which are sent to the various parts of the country. The trade flourishes and can be divided into three categories: A. Food - Grains, Vegetables and Fruits. Milk and milk products. B. Agro Based Industries - The most important industries are Sugar, Gur, (Cotton) Textile and Cigarettes. C. Industrial Goods- Paper, Sugarcane, Hosiery Material & Wood Carving. Besides exporting goods from here the region also imports Coal, Iron–ore, Cement, Salt, Petroleum Products, Fertilizers, Oil-Seeds and Leather from Punjab, Haryana, Rajasthan, Delhi and Bihar.

According to the 2011 census the Saharanpur district had a population of 3,464,228, roughly equal to the nation of Panama or the US state of Connecticut. This gives it a ranking of 92nd in India (out of a total of 640). The district has a population density of 939 inhabitants per square kilometre (2,430/sq mi). Its population growth rate over the decade 2001-2011 was 19.59%. Saharanpur has a sex ratio of 887 females for every 1000 males, and a literacy rate of 72.03%.

Culturally, Saharanpur district is similar to the rest of western Uttar Pradesh. It is home to the Paper and Pulp Technology Institute which is affiliated to the Indian Institute of Technology, Roorkee (formerly Roorkee University) and Central Pulp and Paper Research Institute (Ministry of pulp and paper industry).

4.2.3 District Muzaffarnagar

Muzaffarngar district is a district of Uttar Pradesh state in northern India. It was part of Saharanpur division. The city of Muzaffarnagar is the district headquarters. This district is also the part of National Capital Region. Muzaffarnagar district gained notoriety in the 20th century with frequent incidents of loot, murders, kidnappings and dacoity. The 2013 Muzaffarnagar riots between Hindus and Muslims resulted in 62 deaths. Shamli and adjoining Muzaffarnagar districts are considered sensitive ever since large-scale communal violence erupted in August and September 2013. More than 50 people had died and over 50,000 were rendered homeless. The riot that ensued had engulfed many districts of western UP.

The district is divided into 9 blocks, viz., Muzaffarnagar, Budhana, Baghra, Shahpur, Purquazi, Charthawal, Morna, Jansath and Khatauli. According to the 2011 census Muzaffarnagar district has a population of 2,827,154, roughly equal to the nation of Lebanon or the US state of Oregon. This gives it a ranking of 125th in India (out of a total of 640). The district has a population density of 960 inhabitants per square kilometre (2,500/sq mi). Its population growth rate over the decade 2001-2011 was 16.8%. Muzaffarnagar has a sex ratio of 886 females for every 1000 males, and a literacy rate of 70.11%. Minority population is about 40% of the total population of the district Muzaffarnagar is a category "B1" district i.e. having socio-economic parameters below the national average. There are two medical colleges and five engineering colleges in this district. There are four management colleges and eight degree colleges in the city.

4.2.4 District Meerut

Meerut district is one of the districts of Uttar Pradesh state of India, and Meerut is the district headquarters. Meerut district is a part of Meerut division. The district was established under British rule in 1818 and, on establishment, constituted the then tehsils of Meerut, Ghaziabad, Mawana, Baghpat, Sardhana and Hapur. Meerut district lies between 28°57’ to 29°02’ North latitude and 77°40’ to 77°45’ East longitude in the Indo-Gangetic plains of India. It is bound on the north by Muzaffarnagar district, in the south by Bulandshahar district while Ghaziabad

and Baghpat districts form the southern and western limits. The river Ganges forms the eastern boundary and separates the district from Moradabad district and Bijnor district. The Hindon forms the western boundary and separates the district from Baghpat. The ground is not rocky and there are no mountains. The soil is composed of pleistocene and sub-recent alluvial sediments transported and deposited by river action from the Himalayan region. These alluvial deposits are unconsolidated. Lithologically, sediments consist of clay, silt and fine to coarse sand. Land is very fertile for growing crops, especially wheat, sugarcane and vegetables.

According to the 2011 census Meerut district has a population of 3,447,405, roughly equal to the nation of Panama or the US state of Connecticut. This gives it a ranking of 94th in India (out of a total of 640). The district has a population density of 1,347 inhabitants per square km. Its population growth rate over the decade 2001-2011 was 15.92%. Meerut has a sex ratio of 885 females for every 1000 males, lower than the state average of 908; while the child sex ratio is 850, lower than the state average of 899. The district has a literacy rate of 74.80%, higher than the state average of 69.72%. According to the 2001 census, the district ranked 6th in terms of population density in Uttar Pradesh. The district had an average literacy rate of 65.96%, higher than the national average of 64.8% and the state average of 57.36%. 16.66% of the population was under 6 years of age. The percentage of Muslim population over 36% (one of the largest among the cities of India).

Meerut is well connected city to national capital Delhi and from meerut can catch weekly train to kochuvelly, by weekly to Madurai, daily to bilaspur, jammu, amritsar Bombay Lucknow, Allahabad Hardwar, Dehradoon this is the main way to reach Mussori by train to Dehradoon then by road to Mussoorie and Meerut has seven railway stations: Meerut City, Meerut Cantt, Partapur, Sakoti Tanda, Daurala, Mohiuddinpur and Pabli Khas.

4.2.5 District Baghpat

Bagpat district is one of the 75 districts of the Indian state of Uttar Pradesh with headquarters at the town of Baghpat. Created in 1997, the district has an area of 1,321

square kilometres and a population of 1,163,991. Baghpat town lies on the east bank of the Yamuna River, and is within the National Capital Region. It has an agriculture-based economy with sugarcane as the main crop, followed by wheat, mustard and vegetables. There are three sugar mills in the district: Bagpat Co-operative Sugar Mills Ltd., Ramala Co-operative Sugar Mills Ltd. and SBEC Sugar Mills Ltd., which are sited in Bagpat, Ramala and Malakpur, respectively.

Baraut, another small city in the district, is known for Digambar Jain College and Jat College (now called Janta Vedic College). It is also famous for the Rim and Dhura as well as its agricultural implements industry. The prominent Ganga Ram Kishorilal family used to be well known in the area, as they owned vast agricultural lands and several mills including the Ganga Oil Mill, which operated pre-independence up to the 1960s and was famous for its pure mustard oil. Badagaon is another well-known village, which is famed for the Digamber Jain temple.

Baghpat district was created in the year 1997 and named after the erstwhile Baghpat tehsil of Meerut district.[2] Bagpat district is divided into 3 tehsils: Baghpat, Baraut, and Khekra. Baghpat tehsil comprises two blocks - Baghpat and Pilana, while Baraut comprises three - Binauli, Chhaprauli, and Baraut. Khekra tehsil comprises only the Khekra block. Baghpat, Baraut, and Khekada are the major towns in the district.

There are three Uttar Pradesh Vidhan Sabha constituencies in Bagpat district: Chhaprauli, Baraut, and Baghpat. Bagpat district is also infamous for the activities of criminals and there are various criminal gangs known as "Giroh" that are active in the region. In spite of this, Bagpat is considered to be one of the best places to live in India because of its green and healthy environment. Bagpat is also one of the most productive districts in terms of sugarcane production.

Baraut is where the famous Janta Vedic and the Digamber Jain Colleges are sited and it is the main education hub of Baghpat. Some villages like Budhera have very high literacy rates and many of the villagers are government employees. Kirthal village is home to one of the ancient gurukul, Arya Maha Vidyalaya, which is reminiscent of the ancient Indian education system.

According to the 2011 census, Bagpat district has a population of 1,302,156, which is roughly equal to that of African nation of Mauritius or the US state of New Hampshire. This gives it a ranking of the 376th most populous districts in India (out of a total of 640). The district has a population density of 986 inhabitants per square kilometre (2,550/sq mi). Its population growth rate over the decade 2001-2011 was 11.87%. Bagpat has a sex ratio of 858 females for every 1000 males, and a literacy rate of 73.54%. Baghpat is a Hindu-majority district, with about 63% Hindu population and 34% Muslim population.

4.2.6 District Hapur

Hapur district, formerly known as Panchsheel Nagar, was announced on 28 September 2011 as one of three new districts of the Uttar Pradesh state of India. It was renamed in 2012. Hapur district is a part of Meerut division. It is undergoing changes for development into a fully realised district. Soon it will be well developed and more administrative facilities will be available. Hapur consists of the tehsils of Hapur, Garhmukteshwar and Dhaulana. It had been part of Ghaziabad district.

4.2.7 District Ghaziabad

Ghaziabad, the headquarters of the district of the same name that was established in 1976, lies on the Grand Trunk road about a mile east of the Hindon river in Lat. $28^{o}40'$ N and Long. $77^{o}25'$ E, 19 km east of Delhi and 46 km south-west of Meerut with which it is connected by a metalled road. Other roads lead west to Loni and Baghpat and east to Hapur and Garhmukteshwar. Buses run at frequent intervals from here to Delhi, Meerut, Aligarh, Bulandshahr, Moradabad, Lucknow and to other districts also. It is an important station on the Northern Railway where railway lines, from Delhi to Calcutta, Moradabad and Saharanpur meet, connecting it with many important cities of India. Bulandshahr and Gautambudh Nagar, on the south-west by Delhi and on the east by the newly-formed district of Hapur. As its boundary is adjacent to Delhi, it acts as the main entrance to Uttar Pradesh and hence is also called the Gateway of Uttar Pradesh.

It is a large and planned industrial city, with a population of 2,381,452. Well connected by roads and railways, and is the administrative headquarters of Ghaziabad District as well as being the primary commercial, industrial and educational centre of western Uttar Pradesh and a major rail junction for North India. Recent construction works have led to the city being described by a City Mayors Foundation survey as the second fastest-growing in the world. Situated in the Upper Gangetic Plains, the city has two major divisions separated by the Hindon River, namely: Trans-Hindon on the west and CIS-Hindon on the east side. The provisional data derived from the 2011 census shows that Ghaziabad urban agglomeration had a population of 4,681,452, of which males were 2,479,710 and females were 2,201,742. The literacy rate was 93.81%. Ghaziabad is a subcategory B1 district of category B i.e. having socio-economic parameters below the national average. It is the second largest industrial city in Uttar Pradesh after Kanpur. The Delhi Metro extends to Dilshad Garden station which is situated at the Apsara Border. At present, it serves the areas of Shalimar Garden, Rajendra Nagar and other neighbouring colonies. This line will be extended to New Bus Stand, Ghaziabad by 2016-17. Work for the same already started in December 2014. Another station exists at Vaishali, which serves that area as well as Vasundhara and Indirapuram, and there is also a station at Kaushambi.

4.2.8 Gautam Budh Nagar District

The District Gautam Buddh Nagar was formed on 6-9-97 with effect from Govt. order no 1249/97/82/97 by carving out the portions of Ghaziabad and Bulandshahar. District Gautam Buddh Nagar includes Dadri and Bisrakh blocks carved out of Ghaziabad, while Dankaur and Jewar blocks have been carved out of Bulandshahar District. 18 other villages from Bulandshahar have also been carved out and have been included in Dankaur and Jewar. District Gautam Budhh Nagar is situated in the west of Uttar Pradesh.The district has area between the two main rivers of india namely Ganga and Yamuna. In the North of the district Ghaziabad and borders of Delhi,in the south Aligarh, In the east Bulandshahar, in the west Border of Haryana State are located. Due to the Sandy and Loam Soil , the main crops of the district are wheat, rice and

sugar cane . In some areas, millet is also planted. The total geographical area of the district is 1442 sq. km.

The district is divided into three tehsils named as Sadar, Daadri & Jewar. Tehsils are divided into Development Blocks. Dankaur is the development block in the Sadar tehsil, Bisrakh & Daadri are the development blocks in the Daadri Tehsil, Jewar is the development block in the Jewar tehsil. The main source of living for the people of this district is agriculture.The main crops of the district are wheat, rice and sugar cane . In some areas, millet is also planted. However, due to Noida & Greater Noida industrial area under Bisrakh block, the main means of livelihood here are industrial workers, technical, engineering & management services. Industrialisation is taking place in the district. So, in terms of economical structure the district is important not just at state level but also at national level. 25% of the total revenue of Uttar Pradesh is received from Gautam Buddh Nagar.

4.2.9 District Aligarh

Aligarh district is a district in the northern Indian state of Uttar Pradesh. The district belongs to Aligarh Division. According to the 2011 census Aligarh district has a population of 36,73,849, roughly equal to the nation of Mauritania or the US state of Oklahoma. This gives it a ranking of 76th in India (out of a total of 640). The district has a population density of 1,007 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 22.78%. Aligarh has a sex ratio of 876 females for every 1000 males, and a literacy rate of 69.61%. With around 30,000 students, Aligarh Muslim University is the centre of higher education in Aligarh. The university offers more than 250 courses in both traditional and modern fields of education. In addition, there are many decent schools and colleges for primary and secondary level education.

4.2.10 District Bulandshahr

Bulandshahr district is a district of Uttar Pradesh state in northern India. Bulandshahr city is the district headquarters. It is part of National Capital Region of India. According to the 2011 census Bulandshahr district has a population of

3,498,507. This gives it a ranking of 85th in India (out of a total of 640). The district has a population density of 788 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 20.09%. Bulandshahar has a sex ratio of 892 females for every 1000 males, and a literacy rate of 76.23%. In 1901, the population was 1,138,101. It is a part of the National Capital Region of Delhi.

4.2.11 District Mathura

Mathura district situated along the banks of the river Yamuna is a district of Uttar Pradesh state of northern India. The historic town of Mathura is the district headquarters. The District is part of Agra division. Mathura is bounded on the northeast by Aligarh District, on the southeast by Hathras District, on the south by Agra District, and on the west by Rajasthan and northwest by Haryana state. Mathura district is an important pilgrimage centre of Hindus. Mathura is located at 27.28°N 77.41°E. It has an average elevation of 174 metres. The climate of Mathura is tropical extreme with very hot summers with temperatures rising beyond 44 °C, and cold and foggy winters with temperature dipping to 5 °C. The average rainfall is 593 mm, received mostly during the monsoons from July to September.

According to the 2011 census Mathura district has a population of 2,541,894. This gives it a ranking of 167th in India (out of a total of 640). The district has a population density of 761 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 22.53%.

Mathura has a sex ratio of 858 females for every 1000 males, and a literacy rate of 72.65%. Mathura is a yadav dominated region with around 3 lakh yadav. Mathura receives a large number of daily visitors besides pilgrims who stay for an average of 3 days. Mathura’s urban area's floating population on normal days is between 100,000 to 125,000 per day, whereas on festive and auspicious days it is over twice the population of urban area.

Region of Mathura was added to British territory in 1803 A.D. Till 1832 A.D, when Mathura was recognised as district, the region was partly administered from Agra and partly from Sadabad. Mathura is governed by a number of bodies, the most important

being the Mathura Nagar Nigam (Municipal Corporation), which is responsible for the master planning of the city. Health care facilities in Mathura are provided by Central, State and Local government facilities, besides numerous private providers. One of the major contributors in the economy of Uttar Pradesh are Mathura Industries. Mathura Refinery located in the city is one of the biggest oil refineries of Asia. This oil refinery of the Indian Oil Corporation is a highly technologically advanced oil refinery. Textile printing industry that includes both sari-printing and fabric dyeing and silver ornaments manufacturing are major industrial contributors to the region. Apart from these other industries are water tap manufacturing units and other decorative and household items. Mathura also is a big centre for production of cotton materials; prominent among them being pure white bleached cotton sarees for women and dhotis for men, and cotton niwar tapes for beds.

4.2.12 District Hathras (Mahamaya Nagar)

Hathras district, is a district of Uttar Pradesh state of India. The town of Hathras is the district headquarters. Hathras district is a part of Aligarh Division. This district occupies an area of 1800.1 km². The district has a population of 1,565,678 (2011 census). Hathras District was created on 3 May 1997 by incorporating parts of the Aligarh, Mathura, Khair and Agra districts. It was given the name Hathras District shortly after.

The district comprises four tehsils: Hathras, Sadabad, Sikandra Rao and Sasni, which are further divided into seven blocks: Sasni, Hathras, Mursan, Sadabad, Sahpau, Hasanpur Baru, Sikandra Rao and Hasayan. According to the 2011 census Hathras district has a population of 1,565,678, roughly equal to the nation of Gabon. This gives it a ranking of 318th in India (out of a total of 640). The district has a population density of 851 inhabitants per square kilometre. Its population growth rate over the decade 2001–2011 was 17.19%. Hathras has a sex ratio of 870 females for every 1,000 males, and a literacy rate of 73.1%. Hinduism an Islam are the predominant religion followed in the district. Four railway stations serve Hathras - Hathras Junction railway station, Hathras Road railway station, Hathras City railway station, and Hathras Kila railway station.

4.2.13 District Kanshiram Nagar (Kasganj)

The district of **Kanshi Ram Nagar** was established on 15 April 2008 by separating Kasganj, Patiali and Sahawar tehsils from Etah district. For a while, the district was named after a politician, Kanshi Ram. The decision taken by Mayawati, chief minister of Uttar Pradesh and president of the BSP provoked protests by lawyers who had proposed to call it in honor of Sant Tulsidas, who was born in the district, that place known as Soron (Sukarkshetra). The district reverted to its original name in 2012. Adjacent districts of Kasganj are Aligarh, Budaun, Etah, Farrukhabad and Khair Tehsil. According to the 2011 census Kasganj district has a population of 1,438,156, roughly equal to the nation of Swaziland or the US state of Hawaii. This gives it a ranking of 345th in India (out of a total of 640). The district has a population density of 736 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 17.05%. Kanshiram Nagar has a sex ratio of 879 females for every 1000 males, and a literacy rate of 62.3%.

4.2.14 District Agra

Agra district is one of the 75 districts of Uttar Pradesh state of India, and the historical city of Agra is the district headquarters. Agra district is a part of Agra division. Agra district is bounded by Mathura District on the north, Dholpur District of Rajasthan state on the south, Firozabad District on the east and Bharatpur District of Rajasthan State on the west. Area of the district is 4027 km². Agra district comprises 6 tehsils which are Etmadpur, Agra, Kiraoli, Kheragarh, Fatehabad and Bah. The headquarters of the district is Agra city. The district consists of 15 blocks, namely Etmadpur, Khandauli, Shamshabad, Fatehabad, Jagner, Kheragarh, Saiyan, Ac hhnera, Akola, Bichpuri, Fatehpur Sikri, Barauli Ahir, Bah, Pinahat and Jaitpur Kalan.

According to the 2011 census Agra district has a population of 4,380,793, roughly equal to the nation of Moldova or the US state of Kentucky. This gives it a ranking of 41st in India (out of a total of 640). The district has a population density of 1,084 inhabitants per square kilometre (2,810/sq mi). Hindus are 88.77% and Muslims are 9.30% in Agra district. Its population growth rate over the decade 2001-2011 was 21%. Agra has a sex ratio of 859 females for every 1000 males, and a literacy rate of

69.44%. Languages spoken include Braj Bhasha, which is a rural dialect of Hindi, predominant in the nebulous Braj region centred on Mathura and Agra in Uttar Pradesh and Dholpur and Bharatpur in Rajasthan. It is the predominant language in the central stretch of the Ganges-Yamuna Doab.

An official Census 2011 detail of Agra, a district of Uttar Pradesh has been released by Directorate of Census Operations in Uttar Pradesh. Enumeration of key persons was also done by census officials in Agra District of Uttar Pradesh. In 2011, Agra had population of 4,418,797 of which male and female were 2,364,953 and 2,053,844 respectively. In 2001 census, Agra had a population of 3,620,436 of which males were 1,961,282 and remaining 1,659,154 were females. There was change of 22.05 percent in the population compared to population as per 2001. In the previous census of India 2001, Agra District recorded increase of 31.60 percent to its population compared to 1991.

Agra Municipal Corporation formed with the aim of providing civic amenities related to infrastructure as well as daily needs of the people. The city is famous for its heritage and historical buildings. Tourists visit Agra not only from the country but also from all over the world. It is well connected to major cities of the country through railways, road and air transport. The Nagar Nigam of Agra therefore addresses problems that are related to infrastructure facilities and provide services based on urban standards. In order that everyone can avail their services, the Municipal Corporation of Agra has divided the city into different wards, which work for the betterment of facilities in their area. The Agra Municipal Corporation functions primarily to provide sufficient water supply, maintaining health and hygiene standards, maintenance of sewerage and drainage system. Besides all this, it is also in charge of regulating and collecting house tax and building tax and issuing birth and death certificates. It also gives tenders to private associates for commencement of any new construction or project.

Agra, designated as a world heritage site, faces a number of challenges in terms of water, sewerage and financing municipal works. There is a bursting strain on the infrastructure and services, both from its own population and from the regular onslaught of visiting tourists, estimated at 1.80 million every year. In the city, Agra Jal

Sansthan (AJS) is in charge of operation and maintenance, and revenue collection in supplying water, while all capital works related to water supply and sanitation are undertaken by Agra Jal Nigam (AJN). The total water demand of the city is 320 million litres per day, which includes the demand for bulk supply, estimated at 75 mld. It is now well-recognized that, in the Indian Context, planning is essentially a mechanism of deliberate intervention in an ongoing development process which is constantly changing its course because of internal dynamics as well as environmental factors, Planning at the State level is meant to sub serve the dual interests of the national as well as the state's balanced and accelerated development. This means that planners at the state level should play a positive role not only in determining the scope, policies priorities and programmes for the state but also in the formulation of national policies and objectives which determine the overall environment for the development of states.

4.2.15 District Firozabad

Firozabad district forms one of the western districts of the Indian state of Uttar Pradesh, which has Firozabad Town as its district headquarters. The district is a part of the Agra division. According to the 2011 census Firozabad district has a population of 2,496,761, roughly equal to the nation of Kuwait or the US state of Nevada. This gives it a ranking of 173rd in India (out of a total of 640). The district has a population density of 1,044 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 21.62%. Firozabad has a sex ratio of 867 females for every 1000 males, and a literacy rate of 74.6%. The District is connected by rail and bus to major cities. The nearest Airport is in Agra. Longitude is 78 degree east and latitude 27 degrees north at a height of 164.467 metres above mean sea level. The district borders Etawah district to the north and Mainpuri and Etawah to the east with the Yamuna River forming the southern boundary. The area of the district accounts for about 0.8 per cent of the total area of Uttar Pradesh and 1.1 per cent its population. Approximately 73.6 percent of people live in rural areas. Most of the district lies on a plain sloping from north-west to south. Firozabad district has good transportation links due to National Highway-2 linking Delhi with Kolkata & Yamuna Express Way

passing through it as does the busy railway route from Delhi to Kolkata. Agra is 44 km away, Kanpur is 250 km away, Delhi is 250 km away. Nearest Airport is in Agra which is a domestic Airport. Nearest Railway station is in the center of Firozabad and one in Tundla named as Tundla Junction. Firozabad has a major glass industry producing products that include glass bangles and glass hardware so it is also known as Suhag Nagari. Various work is done on bangles in many places known locally as godam.

4.2.16 District Etah

Etah district is one of the districts of Uttar Pradesh state of India, and Etah town is the district headquarters. Etah district is a part of Aligarh Division. The driving distance from New Delhi to Etah is 207 km. In 2006 the Ministry of Panchayati Raj named Etah one of the country's 250 most backward districts (out of a total of 640). It is one of the 34 districts in Uttar Pradesh currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

According to the 2011 census Etah district has a population of 1,761,152, roughly equal to the nation of The Gambia or the US state of Nebraska. This gives it a ranking of 272nd in India (out of a total of 640). The district has a population density of 717 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 12.77%. Etah has a sex ratio of 863 females for every 1000 males, and a literacy rate of 73.27%.

4.3 Salient Features of Upper Ganga Canal Project

The **Ganges** or **Ganga Canal** is a canal system that irrigates the Doab region between the Ganges River and the Yamuna River in India. The canal is primarily an irrigation canal, although parts of it were also used for navigation, primarily for its construction materials. Upper Ganga Canal was originally constructed for an head discharge of 6750 cusecs. The Upper Ganges Canal has since been enlarged gradually for the present head discharge of 10,500 cusecs (295 m^3/s). The canal system irrigates nearly 9,000 km^2 of fertile agricultural land in fifteen districts of Uttar Pradesh and one district of Uttarakhand. Today the canal is the source of agricultural prosperity in much of these

states, and the irrigation departments of these states actively maintain the canal against a fee system charged from users.

There are 8 small hydroelectric plants with installed capacity of 44.5 MW on the canal. They include Pathri (20.4 MW), Mohammadpur (9.3 MW), Nirgajini (5MW), Chitaura (3 MW), Salawa (3 MW), Bhola (2 MW), Palra (0.6MW) and Sumera (1.2 MW). The Upper Ganga Canal System is the largest perennial and one of the oldest irrigation system of India. The planning of this system was started in 1838 and the feasibility report was approved by a committee of engineers in 1842. The construction of this system was started in 1848 after approval of the project by Lord Harding, the Governor General and was completed in 1854, in a record time of 6 years. The canal was commissioned on 8th April 1854 and the irrigation was started on 1st May 1855 after trial running and necessary improvement. This project was constructed under the guidance of Eminent British Engineer Colonel Sir Probey Cautley. The Ganga canal off takes from the right bank of river Ganga at Haridwar, presently in the state of Uttrakhand. The last branches of this system - Kanpur and Itawa branches outfall in river Ganga. This canal provides irrigation facility to the districts Haridwar in the state of Uttarakhand and districts Saharanpur, Muzaffarnagar, Meerut, Baghpat, Hapur, Ghaziabad, Gautam budh Nagar, Aligarh, Bullandshahr, Mathura, Hathras, Kasganj, Agra, Firozabad and Etah in the state of Uttar Pradesh. The river Ganga is a perennial river connected to several glaciers in the Himalayan mountain. In its initial course the river Alaknanda and Bhagirathi meet at Dev Prayag and after their confluence, the resulting river is known as Ganga. The Dev Prayag is approximately 70.0 Km from Haridwar- the off taking point of the Upper Ganga canal. The contribution of Alaknanda is approximately 66% and river Bharigathi is 34% in the river Ganges. The total catchment area of the river Ganga above Haridwar is approximate 20,000.00 Sq Km in Himalayan mountains. The river Ganga flows through the plains of U.P. from the north west end to south east end portion of the state of Uttar Pradesh. This river is the life line of large fertile agricultural tracks on its both banks. The economy of the inhabiting farmers mainly depends on the irrigation water which is supplied from the river Ganga. Originally the Canal was designed with a head discharge of 6750 cusecs capacity (192 m3/s), which later on in 1938, was increased to 8500 cusecs (242 m3/s) and in 1951-

1952 it was again increased to 10,500 cusecs (300 m3/s). Presently its design head discharge capacity is 10,500 cusecs. In the beginning the water from the river Ganga was diverted in the Ganga canal with the help of temporary bunds constructed every year after the end of the monsoon. Later on, in 1920, a pucca weir was constructed at Bhimgoda across river Ganga and the weir was replaced by a barrage in the year 1986 to meet out the regulation requirement of the Ganga canal. The length of the main canal, branches, distributaries and minors of the system are given in Table 3 below:

Table 3 Length of Canal Network

S. No.	**Details**	**Length (Km)**
1	Main Canal	291.96
2	Branches	56236
3	Distributaries	3299.95
4	Minors	2427.95
	Total	6582.22

The Upper Ganga Canal System which was planned about 154 year ago is still able to cater to the current needs of the population of the Ganga canal command area, where the current population has increased several times from the population of 1840. The water in the Ganga canal is full of natural ingredients (silt in particular). The Ganga canal water is also used for drinking purposes mainly by Delhi, Noida, Ghaziabad, Meerut, Greater Noida, Mathura and Agra etc. and for industrial purposes by thermal power plants. There is huge demand of water from different districts for drinking purposes. Salient features of the project are given in Table 4.

Table 4 Salient Features of Upper Ganga Canal Irrigation Project

Name of the Project	Upper Ganga Canal
Type of Project	Diversion
Category of Project	Major
Name of Basin	Ganga
Irrigation Circles/ Divisions	4 Circles comprising 10 Divisions
Circle-1: Ganga Canal Sanchalan Mandal, Meerut	1. North Khand Ganga Canal, Roorkee, Uttarakhand
Circle 2: Irrigation Works Circle, Meerut	1. Anupshahr Shakha Khand, Ganga Canal, Meerut. 2. Meerut Khand Ganga Canal, Meerut 3. Muzaffar Nagar Khand Ganga Canal, Muzaffar Nagar.
Circle-3 : Irrigation Work Mandal , Mathura	1. Upper Mat Division, Khurja 2. Lower Mat Division, Mathura. 3. Irrigation Department, Hathras
Circle 4 : Drainage Mandal, Aligarh	1. Aligarh Khand Ganga Canal, Aligarh 2. Bulandshahr Khand Ganga Canal, Bulandshahr 3. Irrigation Khand, Firozabad.
Districts Benefitted	Haridwar, Saharanpur, Muzaffar Nagar, Meerut, Hapur, Ghaziabad, Gautam Budh Nagar, Bulandshahr, Aligarh, Mathura, Hathras, Kasganj, Firozabad, Etah, Agra
Year of Commencement of Project	1858
Year of Completion	1884
Address of Project Headquarters	Ganga Bhawan, Meerut, U.P.
Number of Head Regulators	6
Location of head regulators	4 R, 2 L
Volume of Water Released through head regulators (MCM) 2012-13	7576 MCM from Mayapur Regulator 2000 MCM from Madhya Ganga Canal
2012-13: Kharif	4213 MCM
2012-13 : Rabi	3363 MCM
Total	7576 MCM
CCA of the project as per DPR	904700 ha
CCA of the project at the time of Survey	878283 ha
Irrigation Potential Created (IPC)	699090 ha

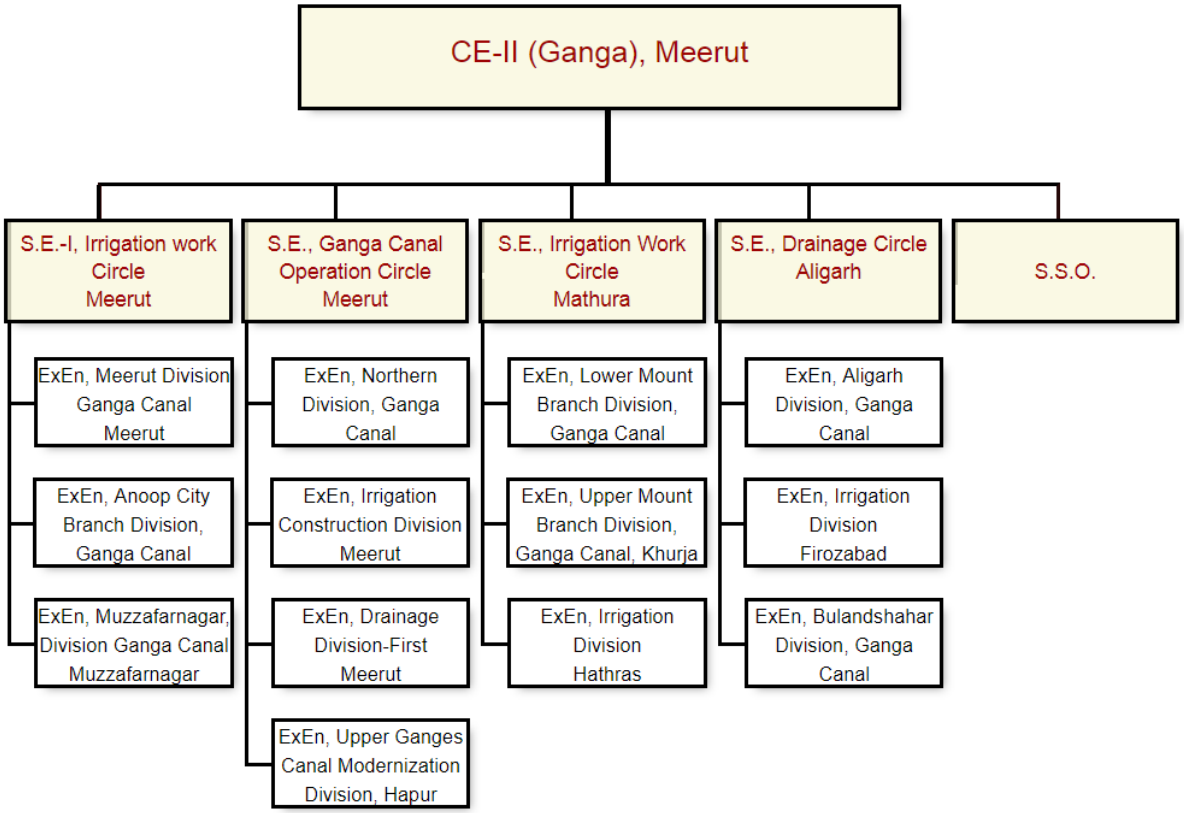


Fig 2 Organization Structure of Upper Ganga Canal Irrigation Project

Table 5 Details of Upper Ganga Canal Irrigation Project

Circle/Division	CCA (ha)	PPA* (ha)
SE Circle - I	**Ganga Canal Operation Circle**	
EE Drainage Div-I, Haridwar	5717.19	2344.05
Total Circle I	**5717.19**	**2344.05**
SE Circle -II	**Irrigation Works Circle, Meerut**	
EE Muzaffar Nagar Div. GC	110162	51482.83
EE Anupshahr Branch Div. GC	101796	41736.65
EE Meerut Div. GC	92612	37970.92
Total Circle II	**304570**	**131190.4**
SE Circle –III	**Irrigation Work Circle Mathura**	
EE Irrigation Div. GC Hathras	90365	37049.65
EE Upper Mat Br. Div. Mathura	127694	52354.54
EE Lower Mat Br. Div. Khurja	71743	29414.63
Total Circle III	**289802**	**118818.82**
SE Circle - IV	**Drainage Circle Aligarh**	
EE Aligarh Division, GC	93957	38522.37
EE Bulandshahr Division GC	79340.7	32529.69
EE Ferozabad Division GC	104895.964	43007.35
Total Circle IV	**278193.66**	**114059.4**
Total UGC	**878282.86**	**366412.68**

∗ ***PPA is Proposed Project Area – Net Irrigable Area in Project Command***

IPC of the project is 699090 ha.

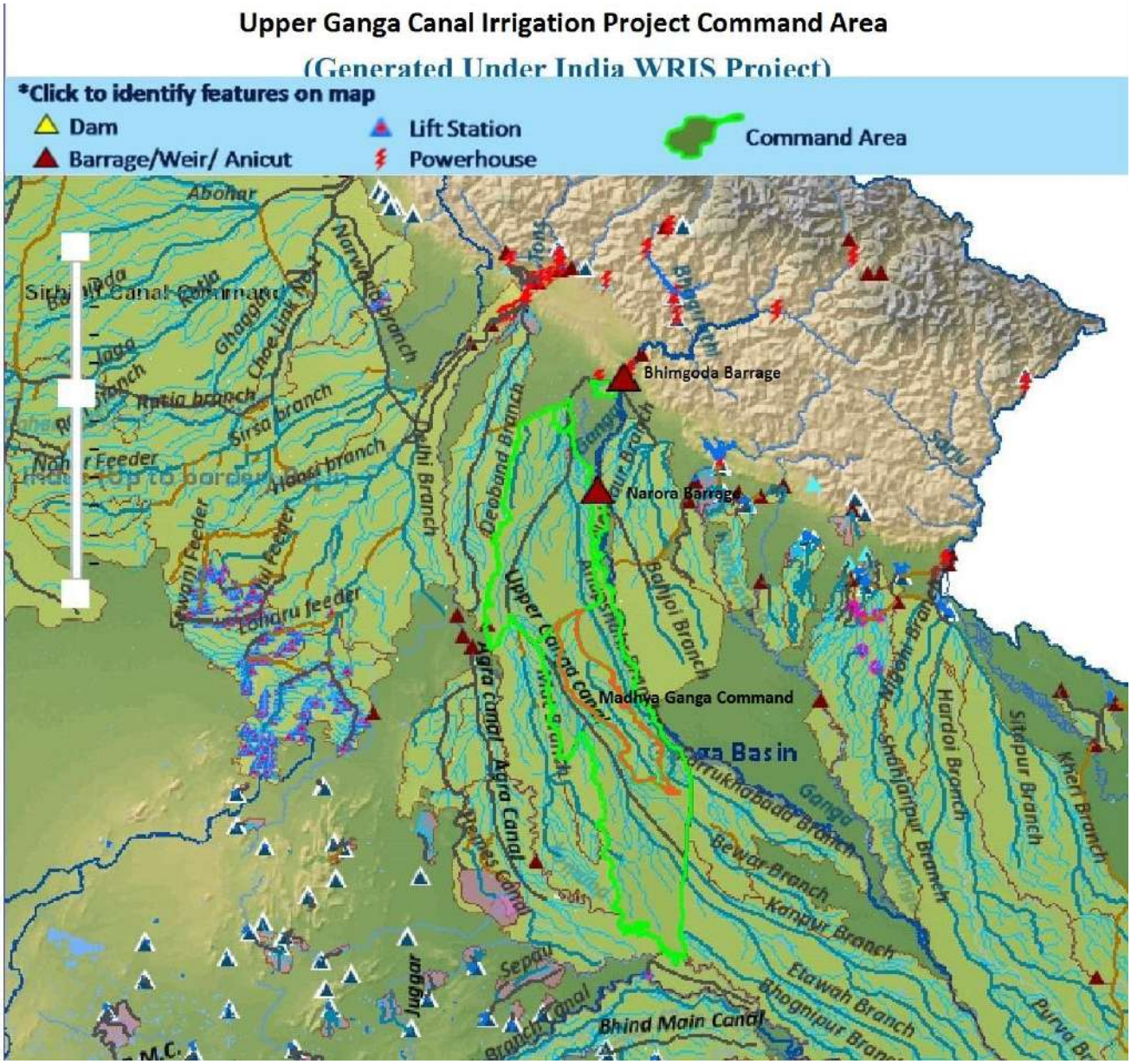


Fig. 3 Command Area Map of Upper Ganga Canal Irrigation Project

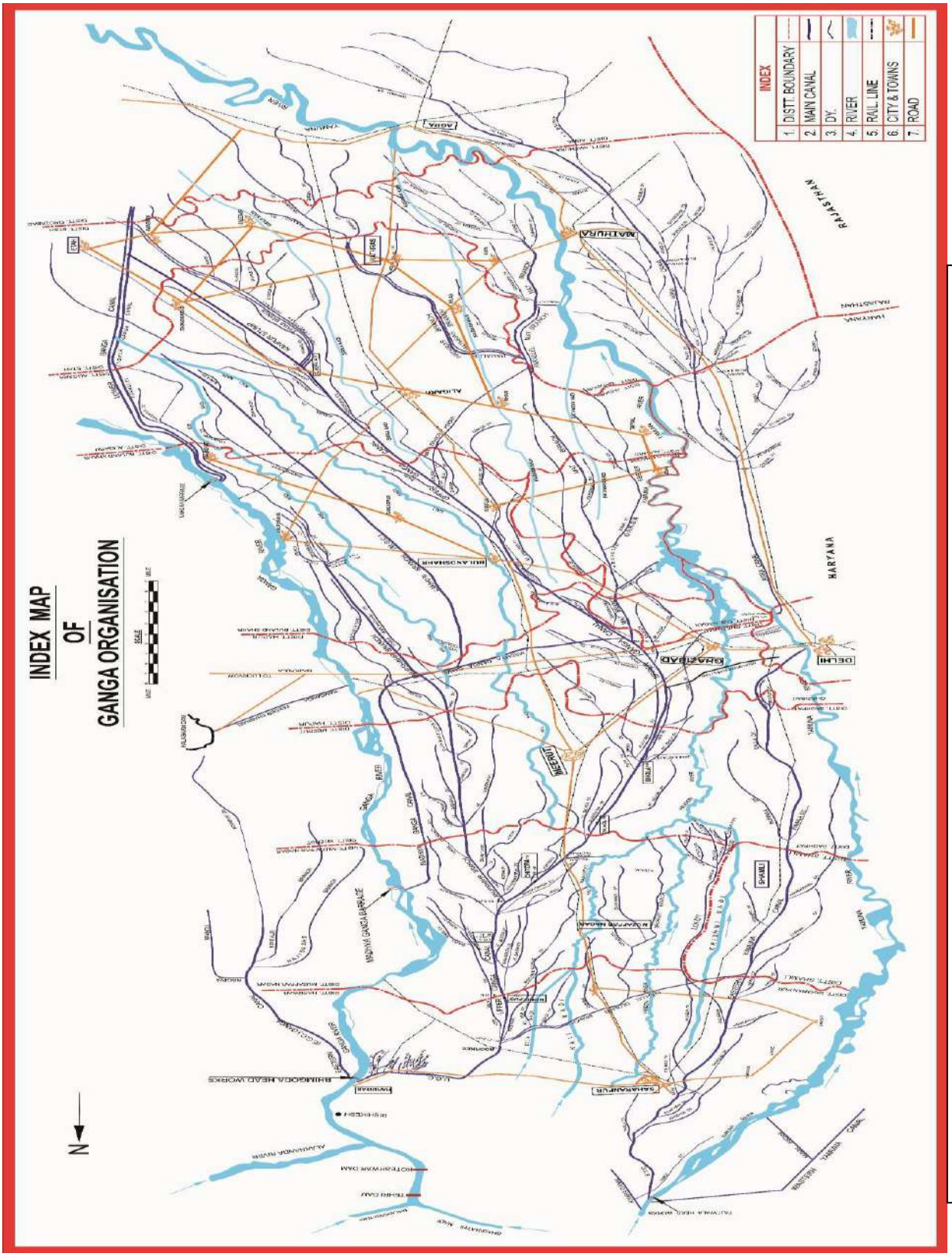
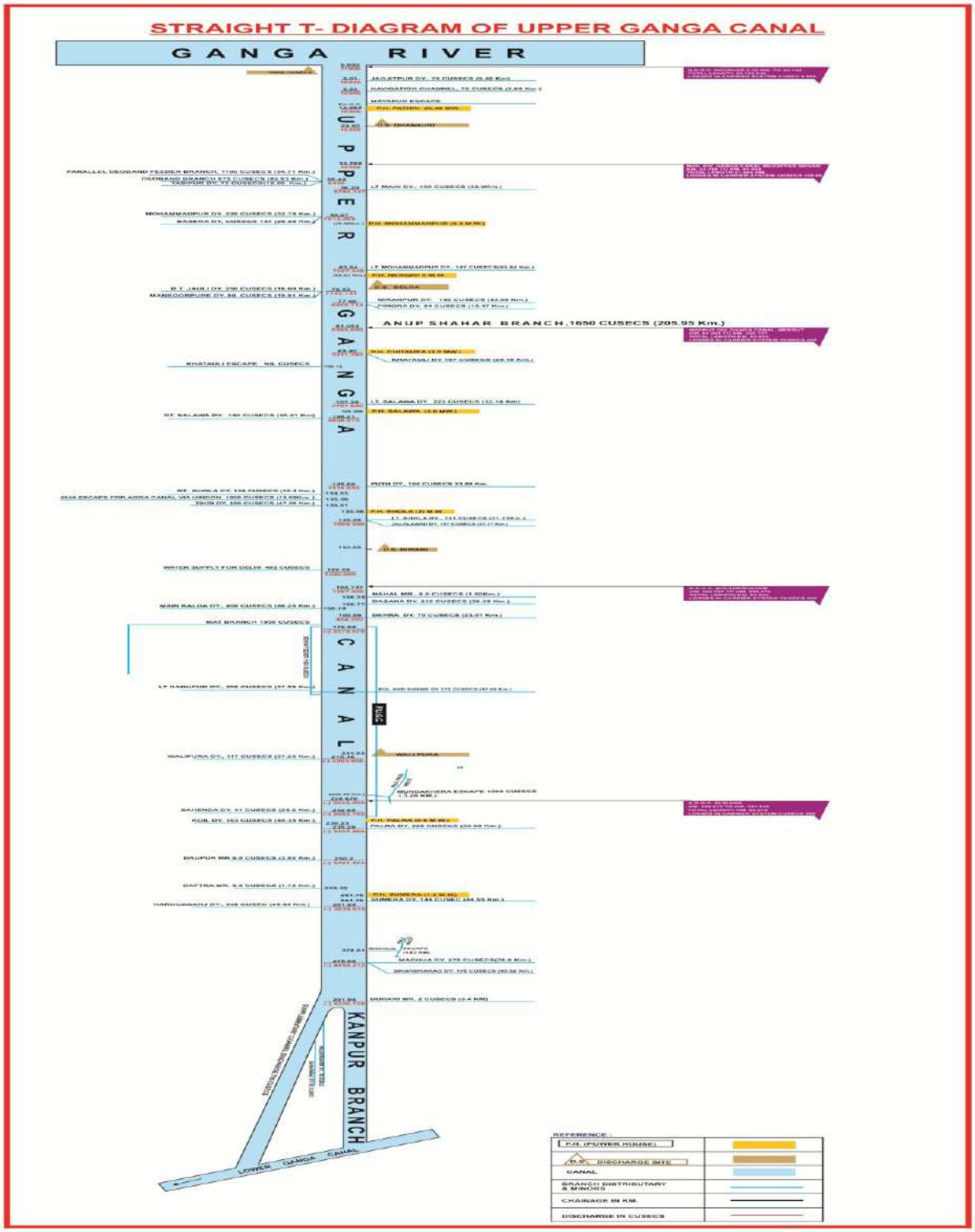


Fig. 4 Index Map of Upper Ganga Canal Irrigation Project


STRAIGHT T- DIAGRAM OF UPPER GANGA CANAL
GANGA RIVER
UPPER GANGA CANAL
ANUP SHAHAR BRANCH ,1650 CUSECS (205.95 Km.)
KANPUR BRANCH
LOWER GANGA CANAL
REFERENCE :
P.H. (POWER HOUSE)
D.S. DISCHARGE SITE
CANAL
BRANCH DISTRIBUTARY & MINORS
CHAINAGE IN KM.
DISCHARGE IN CUSECS

5. Approach and Methodology

5.1 Methodology Envisaged

In order to accomplish the task the following methodology was envisaged to be adopted.

i. Constitution and deployment of a Multi-Disciplinary Team of Experts and required field teams;

ii. Orientation and training programme for the Field Teams (Supervisors and Enumerators) for field survey. The Field teams, so deployed, will be working under the overall guidance and supervision of the Core Team deployed at Head Quarters;

iii. Discussions with State Level Departmental Heads as well as CWC Regional Heads by personnel of Core Team and Field Team;

iv. Discussions with Senior Irrigation/Water Resources Department Officials at different levels;

v. Secondary data as available with state Govt. Including area irrigated under each crop, amount of water released in main canal, branch canal, distributary, minor up to outlet level etc. in each crop season was envisaged to be collected. Additionally, the data was proposed to be collected for Head, middle and tail reach of the canal network

vi. Index and Canal Network Map were to be procured from project authorities. Additionally, list of outlets for entire system of each of the projects along with their chainage/RD was also proposed to be procured;

vii. It was envisaged to collect information on storage versus water released during the year so as to correlate the same with the rainfall, existing cropping pattern to estimate the gap between potential created and potential utilized.

viii. CWC had collected inventory details the project in structured format under Phase I**.** Filled in schedule prescribed for Data Collection by CWC for Phase I is given in (Annexure-1). CWC desired that the information collected by them earlier and

supplied to AFC India Limited (Annexure-1) shall be vetted while carrying out the survey. It was also desired by CWC that the data gaps, if any, identified in the project shall be filled in during the interactions and from various records maintained with the project officials at different levels.

ix. However detailed project information including outlet details are to be collected by the consultant during interaction with stakeholders as envisaged by CWC vide their Proforma specifically designed for Phase-II of the study.

x. During interactions with CWC officials it was desired that while carrying out the survey for collection of information as solicited in Proforma -II to identify the gaps as reported by project-authorities and reasons thereof, constraints and difficulties, if any.

xi. The team would visit the project area to get the first-hand information on the status of canal distribution system including outlet details as per Proforma II and have discussions with state Govt officials, farmers, Water User Associations etc., to identify the lacunas in achievement of full utilization of created potential.

xii. During interactions with state Govt. officials, efforts may be made to identify remedial measures for minimizing the identified gaps of IPC and IPU;

x. Coordinates (Latitude and Longitude) of the each of the outlets will be recorded by the Field Team at the sill level of each outlets using GPS rovers for the respective canal systems;

xi. The collected data will be geo-referenced to get the Single Line Diagram (SLD) and KML files for the canal network;

xii. Study teams will interact with the officials/departmental staff as well as group of the farmers in the outlet command villages to identify the gaps as reported by the department and actual ground situation reported by the farmers. The Group of Farmers will be representative of the Head, Middle and Tail reaches of the system, individually (minors/distributary), as well as overall (complete canal system).

xiii. The data collected under Proforma I and II shall be shared by CWC with the key functionaries of the respective project authorities to develop a suitable methodology to carry out the main census of major and medium irrigation projects in the country;

5.2 Methodology Adopted

- CWC provided the project details vide filled up Proforma-I as collected from project authorities by them. The same was examined by the AFC team and shortcomings therein were identified for collection during field visits and interaction with state govt officials.
- A multidisciplinary team visited the senior officer at State level and appraised the State Govt. officials about the study being carried out by CWC and the benefits thereof. The senior officials agreed and assured to provide all available information to the team members and directed the field formations to help the team members during their visit to the project area.
- Reconnaissance and site visit was undertaken on 5th July 2016 to get acquainted with the field conditions. Attempted to meet Mr. Sudhir Kumar Sharma, Chief Engineer, who was on his official tour. In his absence the core team interacted with Mr. Anil Kumar, Superintending Engineer in Meerut Circle of Irrigation Department looking after the Ganga Canal project. The interaction was fruitful and core team discussed various issues involved in the assignment. The core team also procured index map and line diagram for the circle.
- The core team also interacted with the revenue officials of Irrigation Department and arranged field visit to Lavad minor on Anti Distributory of Anupsahar branch of Upper Ganga Canal in Daurala Block of Meerut. The visit was accomplished up to outlet level and condition of the outlets was seen by the core team along with officials of irrigation department.
- The core team also visited the office of Chief Engineer at Regional Office of CWC at Lucknow. Thereafter, contact has been made with the Principal Secretary, Department of Irrigation and Water resources, Govt. of U.P. and other officers of

the department. They have issued a letter to Chief Engineer and Departmental Head, Department of Irrigation and water resources, UP, Lucknow in response to letter issued by GM, AFC India Ltd.

Upper Ganga Canal, Anupsahar Branch Canal Distributary Anti, Minor- Lavad: O/L 3 (L) Lat.: 29°07'27.483"E Long.: 77°46'28.032"

Distributary Anti, Minor- Lavad: Field Staff showing Lavad minor on outlet command map of outlet 2A(R)

Upper Ganga Canal, Anupsahar Branch Canal

Upper Ganga Canal, Anupsahar Branch Canal Distributary – Anti, Minor- Lavad O/L 2 A (L) Lat.: 29° 24' 64" E Long.: 77° 46' 41"	Upper Ganga Canal, Anupsahar Branch Canal Distributary Anti, Minor- Lavad: Core team discussion with field staff of Upper Ganga Canal

Upper Ganga Canal, Anupsahar Branch Canal Distributary Anti, Minor- Lavad: O/L 3 (L) Lat.: 29° 07'48.3" Long.: 77°46'28.32"

Upper Ganga Canal, Anupsahar Branch Canal Distributary Anti

Upper Ganga Canal, Anupsahar Branch Canal Distributary – Anti, Cross regulator for Minor- Lavad: Lat.: 29° 0' 55.9"N Long.: 77° 45' 39.6" E

Upper Ganga Canal, Anupsahar Branch Canal Distributary – Anti, Minor- Lavad: Departmental Field Staff showing Lavad minor on map

- The core team also visited the office of Chief Engineer at Regional Office of CWC at Lucknow. Thereafter, contact has been made with the Principal Secretary, Department of Irrigation and Water resources, Govt. of U.P. and other officers of the department. They have issued a letter to Chief Engineer and Departmental Head, Department of Irrigation and water resources, UP, Lucknow.
- The core Team comprised of Dr. S.K. Jain, Mr. R.K. Chaubey, Mr. Deepak Kumar, Mr. Arvind Shukla, Mr. Ashwini Kumar etc.
- The team visited the project area and interacted with the concerned Executive Engineers and their team of officials at each Division. Detailed discussions were held and the data available at the project office was shared with the AFC team. Subsequently, an official was nominated and deputed by Executive Engineer for providing the relevant information and also to accompany the field team for identification of canal network including outlets located thereof.
- The team met with officials at different levels to procure the data and support for field work. The field work continued with the support of departmental officials for data collection.
- Detailed discussions were held and the data available at the project office was shared with the AFC team. Subsequently, an official was nominated and deputed by Executive Engineer for providing the relevant information and also to accompany the field team for identification of canal network including outlets located thereof.
- The team along with the nominated official traversed along the whole canal network including main canal, distributaries and minors. Cent- percent tracking along the network was made to identify the outlets including their geo-referencing (latitude and longitude) with a hand-held GPS system. The condition and status of the canal, outlet etc., was observed and recorded.
- The Team had an active interaction with the farmers during the survey along the main canal, distributaries and minors and also discuss the state of affair of irrigation/ water availability in the command area and to identify the constraints.

- Data was also collected from Office of the Subdivision Engineers in all the 10 divisions of the project.
- The data so collected has been scrutinize at AFC, Delhi office and shortcomings identified for fulfilling the information in Proforma -II prescribed by CWC.
- The AFC team also interacted with the state govt officials to bridge/ procure the deficient information. However, some information was reportedly not available with the department which have been indicated in the filled up Proforma-I as well as Proforma-II also.
- The data collected by the AFC field teams has been entered in a structured database system. Relevant attribute table has been generated.
- The collected data has been georeferenced for the canal network system for the project.
- The AFC team asked project officials to provide the copy of DPR of the project but it was not available with project officials at different levels.
- After completion of data collection and its analysis the core team interacted with senior project officials to take their views and opinions for consideration in preparation of Draft report.
- ArcGIS software has been used to create canal network, attachment of attributes and generation of *.kml file to view the network components along with attached attributes on google earth.
- Soft copy of the same is enclosed.

6. Generation of Canal Network Diagram

On the basis of field survey using prescribed proforma wherein details of canal network up to outlet level have been captured using the GPS device Zuno- SB of M/s Trimble of USA. The canal network along with command area and the outlets have been shown as the Grids in **Volume –II.**

Dry outlets have been demarcated by separate colour in *kml files. All other outlets are wet outlets (liable to receive irrigation water). Farmers also corroborated it during interaction.

Since the command area map based on Google Earth is quite big and when attempted to print on A0 size the map was pixelated and was not readable. Accordingly, efforts were made and Grid has been formed on Command Area Map. The print of each grid is given along with Index map for easy readability.

Since a large number of minor irrigation schemes exist in the command area, the data for them about the location and area covered by them are not available, the same could not be demarcated.

The project DPR was reportedly not available with project officials. However, salient features of the project were made available by project authorities. The designed details about IPC, Cropping Pattern, IPU were not available.

Data of Phase I and Phase-II have been collected as per prescribed format and has been given in Annexure-I and II respectively.

The findings are based on field observations and discussions with various groups. The opinion of project officials was also considered while reporting.

The data in the form of network diagram depicting the canal network has been generated on the basis of field survey and geo-referencing of field observations.

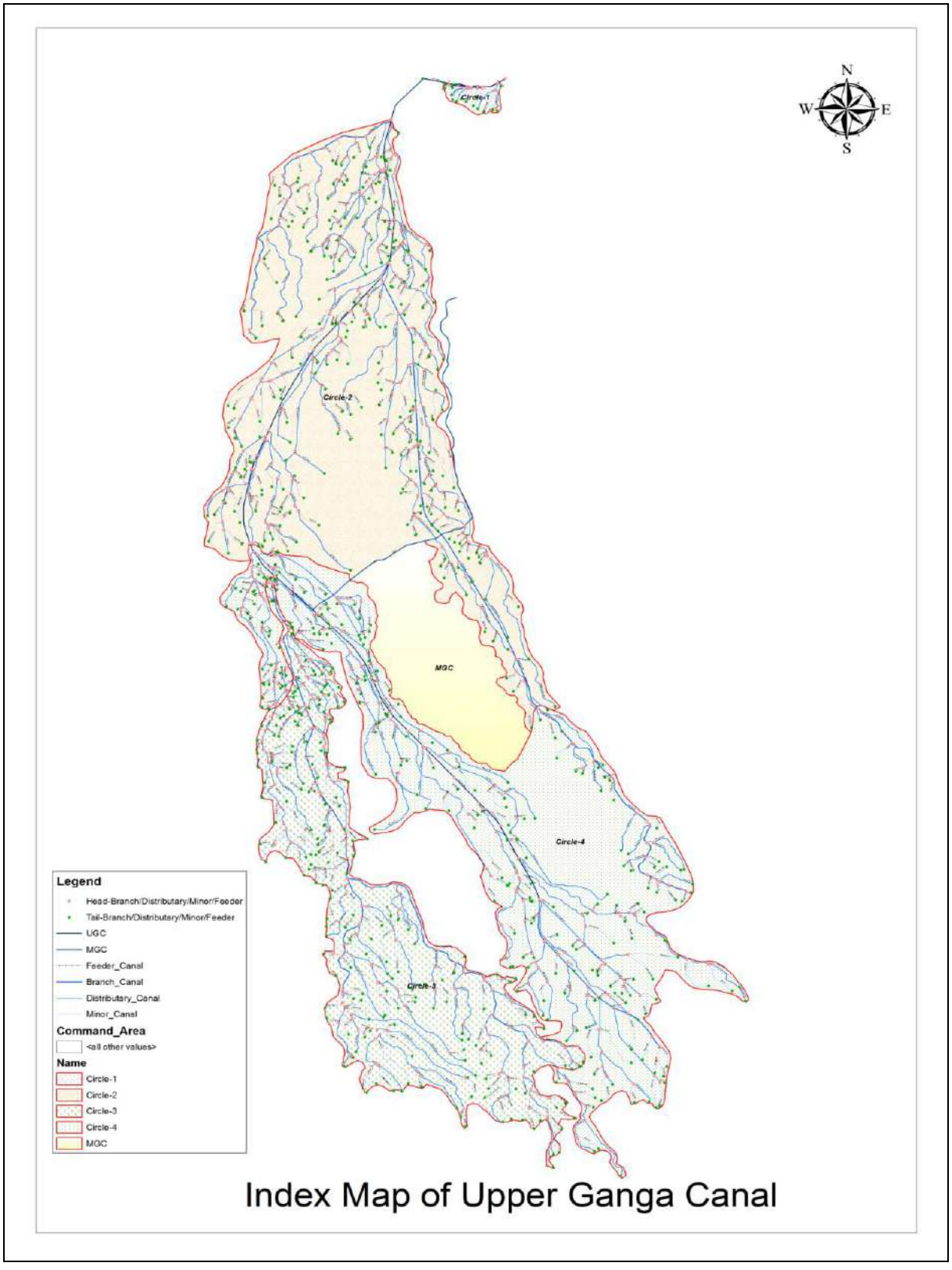


Fig. 6 Command Area and Canal Network of Upper Ganga Canal Irrigation Project

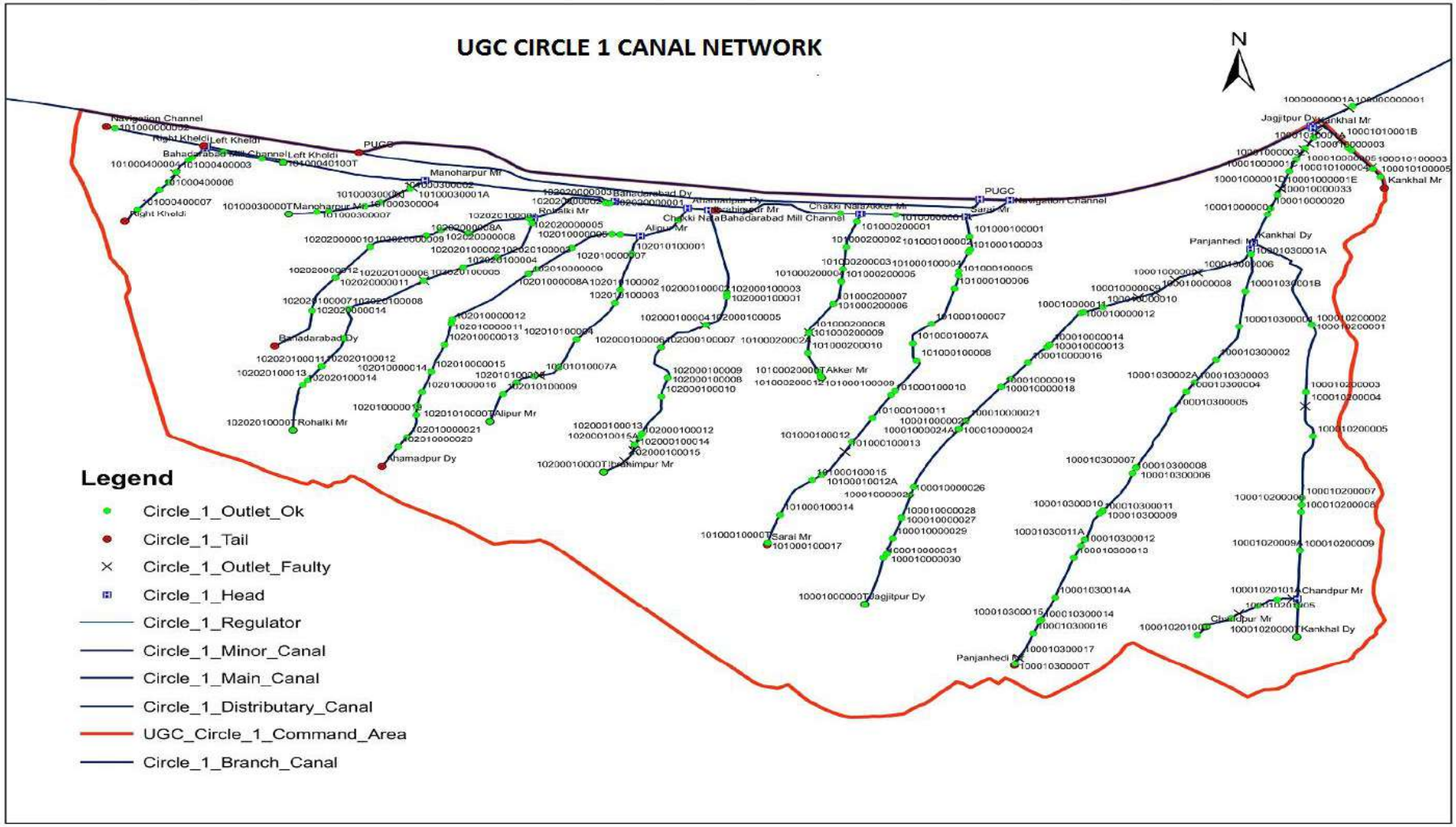


Fig. 7 Command Area and Canal Network of Upper Ganga Canal Irrigation Project (Circle-1)

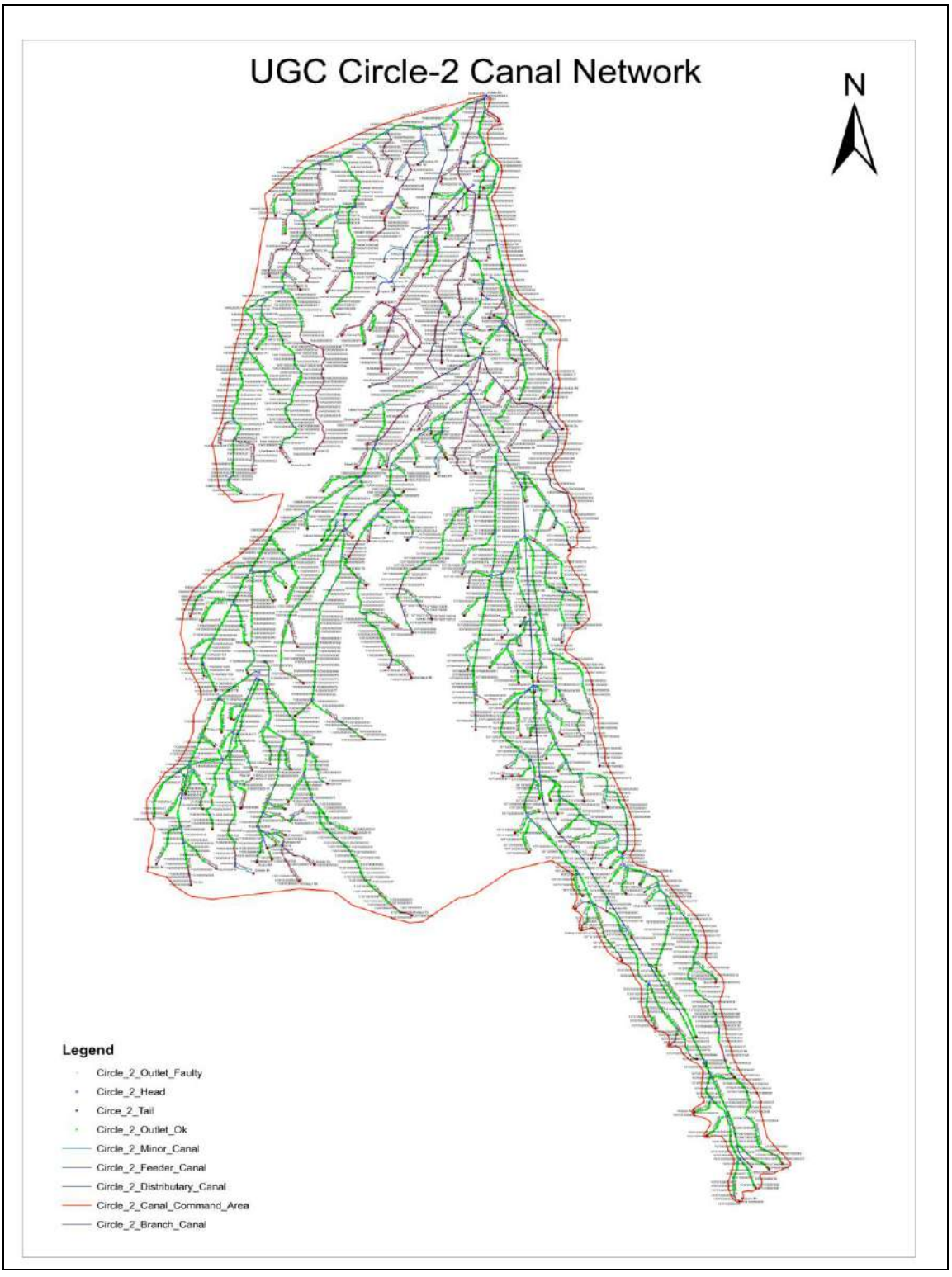


Fig. 8 Command Area and Canal Network of Upper Ganga Canal Irrigation Project (Circle-2)

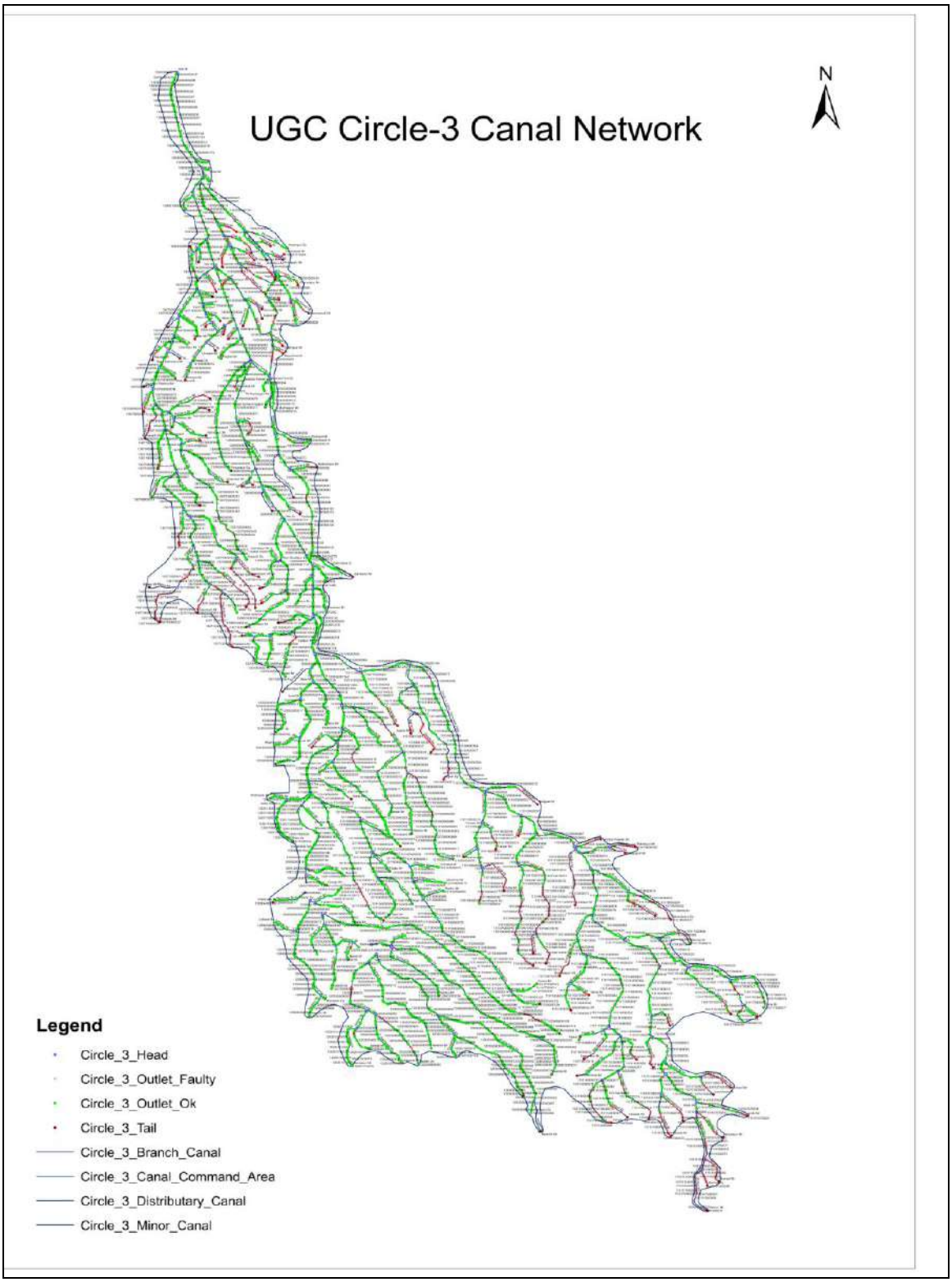


Fig. 9 Command Area and Canal Network of Upper Ganga Canal Irrigation Project (Circle-3)

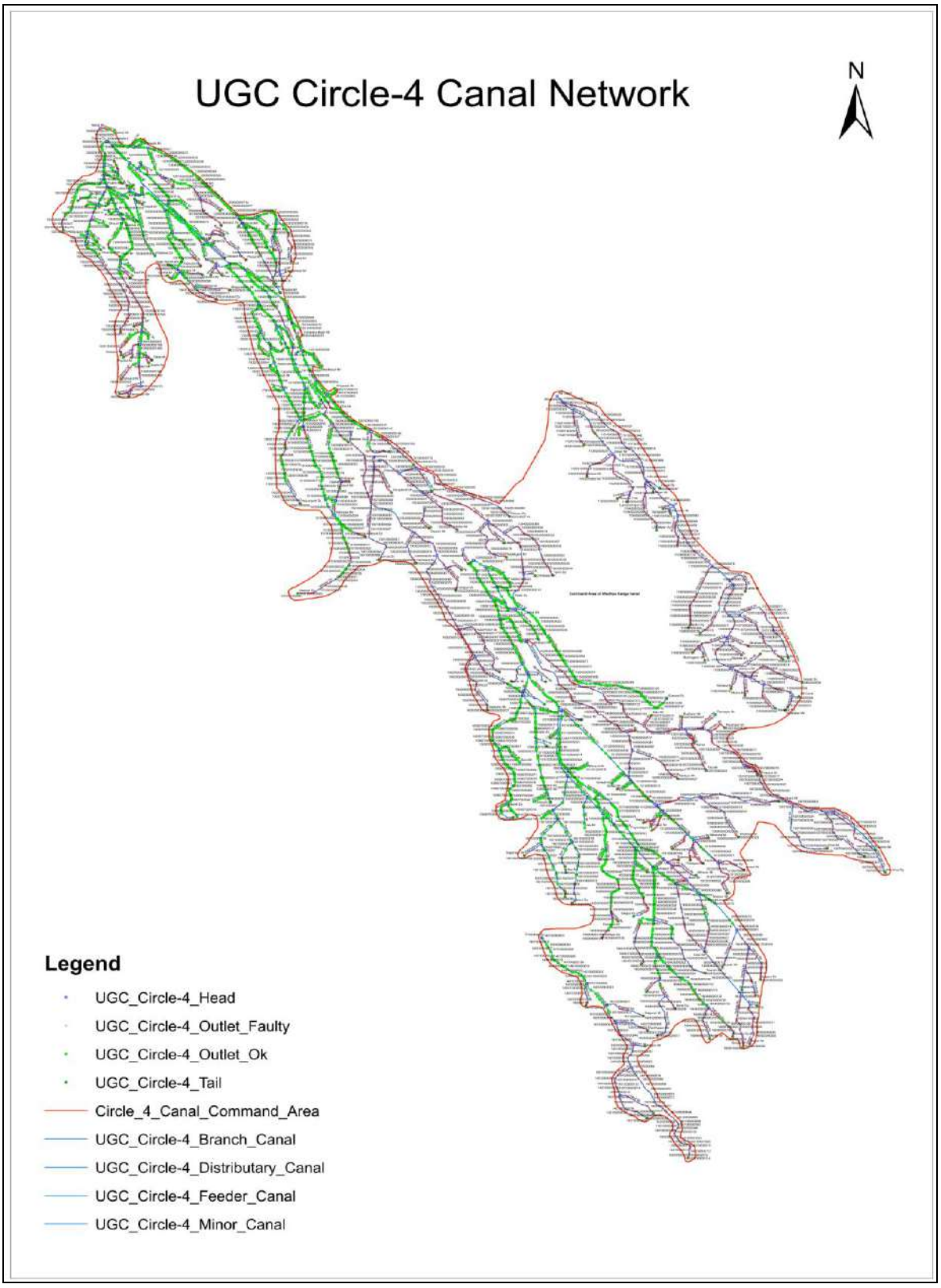


Fig. 10 Command Area and Canal Network of Upper Ganga Canal Irrigation Project (Circle-4)

7. Results and Findings

- The data on IPU has been collected from the project officials on the basis of their records. It was reported that field functionaries of the project note down the area irrigated in their jurisdiction which is then aggregated at higher levels and the figures for the project level is worked out by them.
- The details of CCA, PPA and IPU are given in Table below:

Table 6 CCA, PPA and IPU in UGC (ha) in 2013-14

Circle/ Division Name	CCA	PPA	Cultivated Area		IPU
			Kharif	Rabi	
Haridwar Dn	5717	2344	5784	3818	9602
Circle1	**5717**	**2344**	**5784**	**3818**	**9602**
Muzzfarnagar Dn	110162	51483	63389	33938	97327
Anoop Sahar Dn	101796	41737	52400	37542	89942
Meerut Dn	92612	37971	43712	27974	71686
Circle 2	**304570**	**131190**	**159501**	**99454**	**258955**
Hathras Dn	90365	37050	7583	13742	21325
Mathura Dn	127694	52355	48673	66291	114964
Khurja Dn	71743	29415	17863	18533	36396
Circle 3	**289802**	**118819**	**74119**	**98566**	**172685**
Aligarh Dn	93957	38522	7366	8787	16153
Bulandsahar Dn	79341	32530	35060	26091	61151
Firozabad Dn	104896	43007	17187	11161	28348
Circle 4	**278194**	**114059**	**59613**	**46039**	**105652**
Total Project	**878283**	**366413**	**299018**	**247877**	**546895**

- IPU of the project is found to be 546895 ha during the study.
- The IPC of the project is 699090 ha. Thus the gap during the year 2013-14 between **IPC and IPU was 152195 ha which worked out to be 21.77 %.**

- In the absence of DPR, designed cropping pattern was not available. However actual cropping pattern has been ascertained from the project authorities. Cropping Pattern (2013-14) in the command area of Upper Ganga Canal project is given in following **Table 7**

Table 7 Cropping Pattern in Command Area of Upper Ganga Canal Irrigation Project (2013-14)

Division	Haridwar	Muzaffarnagar	Anopshahr	Meerut	Hathras	Mathura	Khurja	Aligarh	Bulandshahr	Firozabad	Total
KHARIF SEASON *(ha)											
Sugarcane	2142	44164	21288	23131	2081	5005	272	890	1817	2004	**102794**
Rice	654	8938	8098	3225	3851	18377	11728	28217	14831	12684	**110603**
Hort.,Veg. etc	0	4729	4584	4654		52	104	3150	0	0	**17273**
Maize etc	0	0	0	2353	57	1008	2482	4959	510	141	**11510**
Pulses	0	0	0	114	903	2683	3	3663	0	0	**7366**
Chara	0	23566	17964	17380	1104	723	8904	4760	335	46	**74782**
Green Man.	0	0	217	157	63	0	0	3917	0	0	**4354**
others	3321	0	2854	0	0	0	0	0	20414	5628	**32217**
RABI SEASON * (ha)											
Wheat/ barley	1629	23337	20601	16265	7555	19981	15137	29216	18148	12577	**164446**
Bag/ Veg etc	0	0	4200	2392	0	12837	88	3109	1401	610	**24637**
Peas, Pulses	0	33	0	119	19	2499	1067	927	3	21	**4688**
Chara	0	0	9691	12069	0	34	7842	3016	3197	5844	**41693**
Potato	0	0	820	0	0	4947	43	0	0	0	**5810**
Mustard	0	0	0	674	1113	0	0	0	0	0	**1787**
Spices	0	0	0	7	0	0	0	5385	0	0	**5392**
Other	2229	18753	3483	41	7337	0	0	3460	19181	3972	**58456**
Annual *	**9975**	**123520**	**93800**	**82581**	**24083**	**68146**	**47670**	**94669**	**79837**	**43527**	**667808**

* ***Area under crops include area irrigated by other sources also***

- IPU of the project is 546895 ha. **The balance 120913 ha (18.11%) of the cropped area was irrigated by water from other sources.**
- The naming of the canals, distributaries, minors and outlets have been made by project officials as per their own norms.
- Most of the farmers in the command area grow cash crops like sugarcane, paddy wheat, Vegetables etc. Most of them are water intensive. Normally, water is made

available from the canal and its distribution system but shortfalls are being met from groundwater through bore-wells.

- Measures are not being taken to control weed growth on the canal banks resulting in obstruction to the flow of water.
- Farmers grow cash crops/ abundant water crops and refuse to go for water efficient or low water consuming crops. It gets aggravated due to non-availability of measuring devices/ practice of not measuring and keeping track of actual water flow through structures.
- During the survey, it was noticed that the earthen canal/ distributary in general are having weed growth and broken outlets and canal banks resulting in leakage and seepage of water.
- Water is diverted for non-agricultural uses as detailed in **Table 8**

Table 8 Water Supplied for Non-Agricultural Use in Upper Ganga Canal Project

S. No.	Location	User	Quantity (Cusec)
1	Muradnagar Regulator (159.60 Km)	Delhi Jal Board (Bhagirathi T.P.)	200
2	Muradnagar Regulator (159.60 Km)	Delhi Jal Board (Sonia ViharT.P.)	300
3	Dasna Regulator (169.92 Km)	Noida Authority	50
4	Dasna Regulator (169.92 Km)	Greater Noida Authority	80
5	Dehra Regulator (176.80 Km)	NTPC Dadri	60
6	Mat Branch Harnol Escape/ through Baldeo Distributory	Agra City Drinking Water Supply	300
7	Mat Branch (Through Kot Escape)	Agra City Drinking Water Supply	500
8	At 264.0 Km on main UGC	Harduaganj Thermal Power House	106
	Total		**1596**
			Say 1600

Note: In S. No. 1, 2, 3 and 4 Water is supplied through Pipeline

- Canal Capacity at Mayapur Regulator = 10500 cusecs
- Released from Mayapur during 2013-14 = 7602 MCM

  (8879 cusec for 350 days)
- Inflow from MGC during 2013-14 = 2950 cusecs

- Diversion for Non agricultural uses = 3950 cusecs

  (1100 cusec EYC + 1250 cusec Agra Canal + 1600 cusec Non Agricultural Uses)

- Net water availability in the system = 7879 cusecs (**6746 MCM)**
- Season-wise Water Consumption for Agriculture purpose

Circle	Kharif MCM	Rabi MCM	Total MCM
I	27.16	19.88	47.04
II	859.81	645.28	1505.09
III	625.57	536.20	1161.77
IV	839.78	719.81	1559.59
Total	2352.32	1921.17	4273.49

- **Water Use Efficiency= 4273.49/ 6746 = 63.35 %**
- There were 21090 outlets in all the four circles of Upper Ganga Canal Irrigation Project. Out of them **11033 outlets(52%) were found to be damaged/ clogged by weeds and silted during the survey**. The details of affected outlets is given in Table 9 below:

Table 9 Details of Affected Outlets in Upper Ganga Canal Irrigation Project

S. No.	Circle	Outlets (No.)	Affected Outlets	
			(No.)	%
1	Ganga Canal Operation Circle	222	23	10.36
2	Irrigation Works Circle, Meerut	7814	3025	38.71
3	Irrigation Work Circle Mathura	5495	3131	56.98
4	Drainage Circle Aligarh	7559	4854	64.21
	Total	**21090**	**11033**	**52.31**

- There is no incentive to save precious water.
- Proper canal maintenance is lacking leading to weed growth and breakage occurs at different places and outlets leading to obstruction in water reaching tail end. Water reaches up to tail only when it is not required by farmers at higher reaches.
- Neglect and lack of adequate annual budget for operation and maintenance (O& M) so the system deteriorates.
- Due to lack of adequate funds de-silting of canal network is not carried out appropriately resulting in obstruction of free flow of water.

- The irrigation department has to employ manpower through MNREGA scheme only. The manpower thus employed is not trained for carrying out maintenance activity including desilting of canals.
- It is also observed during survey that many people were pumping water from canals to carry the water to their fields and other places.
- The project functionaries reported that due to canal being mostly unlined there is problem of seepage all along the canal.
- Shortage of manpower and resources was also reported to be a major problem in maintenance of canal system.
- At many places canal cross section is deformed including breaches in branches, distributaries and minors.
- Effective Warabandi system is not found in the area leading to gaps.
- Water User Associations (WUA) are non-functional.
- There is lack of proper monitoring of canal operations.
- There is no proper system to monitor actual area irrigated by canal system since no tariff is being charged. Even if a farmer irrigates his field though his own resources, it is being reported to be irrigated by canal.
- Water supply to farmers in the project area is free. No tariff is charged from the farmers. This has led to deliberate diversion of water by farmers and other inhabitants of the area to divert significant quantity of water to uneconomical non-agricultural uses.
- Water theft is one of the important reasons of gap between Irrigation Potential Created and Irrigation Potential Utilized.
- Outlets and canal banks are broken at many places (some typical illustrations are given in photograph section) due to which water divert and do not flow in the direction it was planned.
- The canal being unlined there is problem of seepage all along the canal. The farmers revealed that they do not get water due to seepage in canal system.

- Outlets are broken at many places (some typical illustrations are given in photograph section) due to which water gets diverted and do not flow in the direction it was planned.
- The encroachment was observed on canals by erection of squatters along the canal line. Due to clogging of canals there is disruption of normal flow in canals leading to decrease in irrigation potential utilized. The details of such outlets with locations are given in **Annexure – 3 in Volume – IV** of this report.

8. Constraints/ Reasons for Gap

The reasons for Gap may be categorised as follows:

i. Technical;
ii. Socio-economic;
iii. Institutional/ Managerial;
iv. Policy related and
v. Agriculture

Technical Reasons

- Non-maintenance of water courses/ distributaries, growth of weed, collapse of side slopes, damage to sides and bed, reduced waterways, seepage and leakages of canal waters etc are responsible for gap between IPC and IPU.
- Water supplied once is considered for IPU while Farmers resort to groundwater to supplement water needs for crop. This is disguised gap in IPC and IPU.
- Non-availability of required infrastructure such as Headworks, Control/ measuring devices, broken outlets etc.
- Earthen water distribution channels.
- Frequent breaches.
- Irregular de-silting of distribution channels.
- Incomplete water distribution channels.
- Operation &Maintenance budget being inadequate.

Socio-economic Reasons

- Excessive use of irrigation water many a times results in water-logging.
- Deliberate damage to water outlets.
- Deliberate utilization of area for crops under field channels by farmers as field channels were constructed in their fields.
- Farmers resort to flood irrigation.
- Lack of cooperation among farmers, villages, blocks, districts and departments.

- Often minor disputes related to distribution are blown out of proportion.
- Wastage on account of over irrigation.
- Water not released at the time of requirement.

Institutional/ Managerial Reasons

- Non-existence of effective functional WUAs.
- Low technical exposure of the officials of Irrigation Department at grass root level.
- Modern Managerial training/ capabilities of the Irrigation Department staff for conflict resolution is lacking.
- Lack of staff.
- Lack of Operation & Maintenance Budget.
- Low motivation of Irrigation Department staff
- Lack of supervision by Irrigation Department staff.
- Lack of facilities for Movement along canal network for staff and officers of Irrigation Department.
- Safety considerations of staff.

Policy Related Reasons

- Abolition of practice of revenue collection of water use resulted in wastage/ uneconomical use of water.
- Lack of administrative powers to Irrigation Department staff.
- Number of watering not accounted for IPU computation
- Lack of coordination between line departments including CADA, Agriculture, Revenue etc.
- Diversion of water for other purposes

Agriculture Related Reasons

- Change in demand of irrigation water due to change of cropping pattern over time in the command area
- Increased demand of irrigation water due to use of chemical fertilizers and high yield varieties seeds
- Diversion of cultivable land for other lucrative use

9. Specific Recommendations:

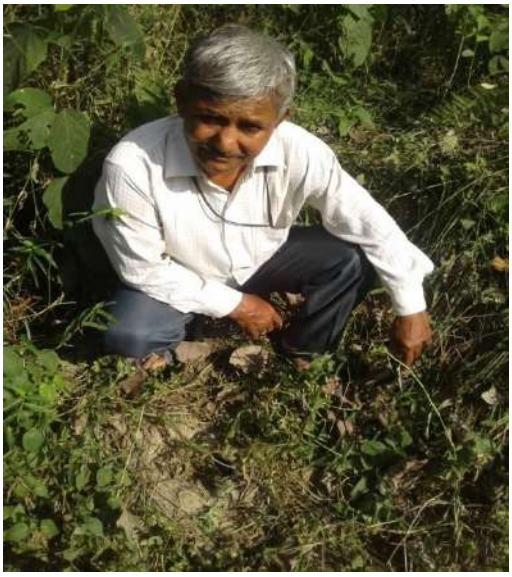
- Present administrative system need to be reviewed to bring all water and agriculture related departments like Irrigation, Agriculture, CADA etc under one umbrella for better coordination and control.
- CCA and IPC of irrigation network shall be updated periodically (say 10 years) to identify the changes in area due to various activities like urbanization, levelling of ground, change in land use etc
- The Upper Ganga Canal irrigation project is almost one and half century old. The system at many places is in a dilapidated condition and needs restoration in the distribution system, outlets etc.
- Regular maintenance of canal system including weed eradication,
- Control of leakage/ theft from canal system to be enforced.
- Control and Measuring devices including modular outlets to be installed to prevent pilferage.
- Since almost one and half century have elapsed the data is also not maintained systematically. It is recommended that suitable data acquisition system along with proper data storage system (DSS) may be evolved for the project to keep track of the precious water resource storage and distribution through the system.
- Adequate monitoring of the system is required.
- Encroachment along canals to be cleared.
- Selective lining in vulnerable reaches to be carried out.
- Propagation of less water intensive crops through modified cropping pattern.
- Monitoring system also needs to be evolved to keep a track of leakage and theft of water.
- Capacity building for field functionaries is required together with adequate staff to keep the system in order. Field functionaries shall undergo orientation programs through classroom and field exposure.

- Field visits to successful projects in other states for on spot visualization by irrigation department officials and farmers.
- Participatory Irrigation Management (PIM) and warabandi to be promoted and enforced.
- Incentive to be given for cultivating water efficient crops.
- Heavy penalties need to be imposed for blocking and breaching the canal system.
- Optimal water rates (volumetric) may be evolved Reach-wise, crop-wise etc.
- Women's participation in water management to be promoted.
- Data to be gathered and maintained digitally in a properly designed Data Storage System (DSS) at Division and above levels.
- Transparency in data maintenance.
- Easy accessibility of data to officials and farmers.
- Adequate budget commensurate with proper maintenance of canal system to be ascertained annually.
- Adequate vehicles should be provided at Division and Subdivision level to facilitate regular monitoring of canal network
- Other sources of funds for O & M may also be explored like canal bank development and recreational facilities, charging of parking and other fees.
- Third party technical and financial monitoring to ascertain proper utilization of manpower, budget and upkeep of system at project level on regular basis tentatively every third year.

10. Photographs of Damaged/ Broken Outlets

CIRCLE-1

		
Photograph Outlet No : Jagjitpur Dy-003		Photograph Outlet No : Jagjitpur Dy-005
		
Photograph Outlet No : Jagjitpur Dy-006		Photograph Outlet No : Jagjitpur Dy-007

		
Photograph Outlet No : Jagjitpur Dy-008		Photograph Outlet No : Jagjitpur Dy-009
		
Photograph Outlet No : Kankhal Dy-004		Photograph Outlet No : Chandpur Mr-005

		
Photograph Outlet No : Panjanhedi Mr-017		Photograph Outlet No : Sarai Mr-013
		
Photograph Outlet No : Ekker Mr-008		Photograph Outlet No : Ibrahimpur Mr-005

		
Photograph Outlet No : Ibrahimpur Mr-15A		Photograph Outlet No : Ibrahimpur Mr-015
		
Photograph Outlet No : Ibrahimpur Mr-014		Photograph Outlet No : Alipur Mr-07A

Photograph Outlet No : Bahadarabad Dy-003

Photograph Outlet No : Rohalki Mr-005

Photograph Outlet No : Right Kheldi Mr-003

CIRCLE-2

		
Photograph Outlet No :Lt Main Dy-0001 (Ok)		Photograph Outlet No :Lt Main Dy-0020 (Broken)
		
Photograph Outlet No : Lt Main Dy-0035 (broken)		Photograph Outlet No : Lt Main Dy-0040 (Broken)

		
Photograph Outlet No : Lt Main Dy-0044(Broken)		Photograph Outlet No :Lt Main Dy-0050(Broken)
		
Photograph Outlet No :Lt Main Dy-0060(Broken)		Photograph Outlet No :Lt Main Dy-0070(ok)

		
Photograph Outlet No :Lt Main Dy-0076(ok)		Photograph Outlet No :Lt Main Dy-0082(Broken)
		
Photograph Outlet No :Lt Main Dy-0090(broken)		Photograph Outlet No :Lt Main Dy-0097(broken)

		
Photograph Outlet No :Lt Main Dy-0105(ok)		Photograph Outlet No :Lt Main Dy-016A(broken)
		
Photograph Outlet No :Lt Main Dy-027B(broken)		Photograph Outlet No :Lt Main Dy-042A(broken)

		
Photograph Outlet No :Lt Main Dy-054A(broken)		Photograph Outlet No : Lt Main Dy-85A(broken)
		
Photograph Outlet No :Lt Main Dy-085B(broken)		Photograph Outlet No :Manglore Mr-0001

		
Photograph Outlet No :Manglore Mr-0006(broken)		Photograph Outlet No :Manglore Mr-0010(broken)
		
Photograph Outlet No :Libbarheri Mr-		Photograph Outlet No :Libbarheri Mr-

0002(broken)		0006(weeds)
		
Photograph Outlet No :Libbarheri Mr-007A(ok)		Photograph Outlet No :Harchandpur Mr-0001(broken)
		
Photograph Outlet No :Harchandpur Mr-0006(broken)		Photograph Outlet No :Harchandpur Mr-0012(broken)

		
Photograph Outlet No :Harchandpur Mr-0019(broken)		Photograph Outlet No :Harchandpur Mr-021A(broken)
		
Photograph Outlet No :Nasirpur Mr-0001(broken)		Photograph Outlet No :Nasirpur Mr-0009(broken)

		
Photograph Outlet No :Nasirpur Mr-002A(broken)		Photograph Outlet No :Nasirpur Mr-004(broken)
		
Photograph Outlet No :Bramhpur Mr-0001(broken)		Photograph Outlet No :Bramhpur Mr-0008(BROKEN)

		
Photograph Outlet No :Tuglakpur Mr-0001(WEEDS)		Photograph Outlet No :Tuglakpur Mr-006(WEEDS)
		
Photograph Outlet No :Bhokarhedi Dy-0001 (BROKEN)		Photograph Outlet No :Bhokarhedi Dy-0010(BROKEN)

		
Photograph Outlet No :Bhokarhedi Dy-0011(BROKEN)		Photograph Outlet No :Bhokarhedi Dy-0017(WEEDS)
		
Photograph Outlet No :Bhokarhedi Dy-0024(BROKEN)		Photograph Outlet No :Bhokarhedi Dy-0030(BROKEN)

		
Photograph Outlet No :Bhokarhedi Dy-031B(BROKEN)		Photograph Outlet No :Firojpur Mr-0001(BROKEN)
		
Photograph Outlet No :Firojpur Mr-001A(WEEDS)		Photograph Outlet No :Deoband Br-0001(OK)

		
Photograph Outlet No :Deoband Br-0019(WEEDS)		Photograph Outlet No :Deoband Br-0030(BROKEN)
		
Photograph Outlet No :Deoband Br-0039(BROKEN)		Photograph Outlet No :Deoband Br-0050(BROKEN)

		
Photograph Outlet No :Deoband Br-0056(WEEDS)		Photograph Outlet No :Deoband Br-0066(WEEDS)
		
Photograph Outlet No :Deoband Br-0080(OK)		Photograph Outlet No :Deoband Br-0090(WEEDS)

		
Photograph Outlet No :Deoband Br-0099(WEEDS)		Photograph Outlet No :Deoband Br-0106(BROKEN)
		
Photograph Outlet No :Deoband Br-0114(BROKEN)		Photograph Outlet No :Deoband Br-0130(WEEDS)

		
Photograph Outlet No :Deoband Br-0145(WEEDS)		Photograph Outlet No :Deoband Br-0148(WEEDS)
		
Photograph Outlet No :Deoband Br-0160(BROKEN)		Photograph Outlet No :Deoband Br-0174(BROKEN)

		
Photograph Outlet No :Deoband Br-0185(BROKEN)		Photograph Outlet No :Deoband Br-0196(BROKEN)
		
Photograph Outlet No :Deoband Br-0205(WEEDS)		Photograph Outlet No :Deoband Br-0222(BROKEN)

		
Photograph Outlet No :Deoband Br-0236(BROKEN)		Photograph Outlet No :Deoband Br-124A(BROKEN)
		
Photograph Outlet No :Deoband Br-174A(BROKEN)		Photograph Outlet No :Deoband Br-218A(BROKEN)

		
Photograph Outlet No :Gadarjudda Mr-0002(BROKEN)		Photograph Outlet No :Gadarjudda Mr-0015(WEEDS)
		
Photograph Outlet No :Gadarjudda Mr-007A(WEEDS)		Photograph Outlet No :Barla Dy-0003(OK)

		
Photograph Outlet No :Barla Dy-0015(OK)		Photograph Outlet No :Barla Dy-0030(BROKEN)
		
Photograph Outlet No :Barla Dy-030B(BROKEN)		Photograph Outlet No :Shidhauli Dy-0012(BROKEN)

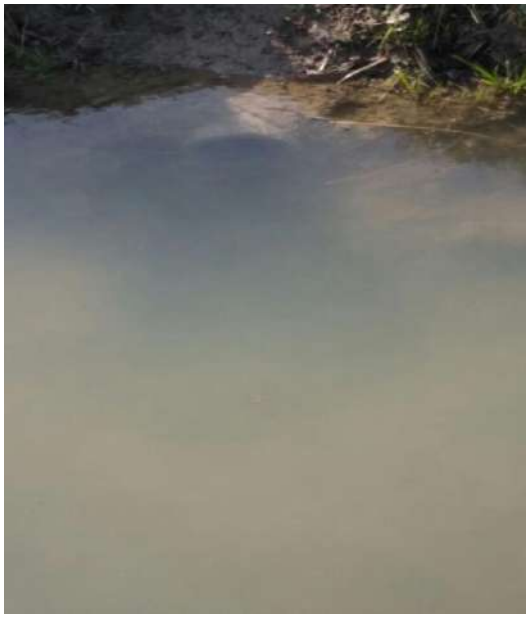
		
Photograph Outlet No :Shidhauli Dy-0029(BROKEN)		Photograph Outlet No :Shidhauli Dy-0045(OK)
		
Photograph Outlet No :Shidhauli Dy-0060(OK)		Photograph Outlet No :Shidhauli Dy-0073(WEEDS)

		
Photograph Outlet No :Shidhauli Dy-000T(BROKEN)		Photograph Outlet No :Dudhali Mr-0001(BROKEN)
		
Photograph Outlet No :Dudhali Mr-0011(BROKEN)		Photograph Outlet No :Sapla Mr-0001(BROKEN)

		
Photograph Outlet No :Sapla Mr-0010(BROKEN)		Photograph Outlet No :Fulaas Mr-0001(WEEDS)
		
Photograph Outlet No :Fulaas Mr-0009(BROKEN)		Photograph Outlet No :Majhaul Mr-0002(weeds)

		
Photograph Outlet No :Majhaul Mr-0018(weeds)		Photograph Outlet No :Majhaul Mr-024A(broken)
		
Photograph Outlet No :Saloni Mr-0001(broken)		Photograph Outlet No :Saloni Mr-014B(broken)

		
Photograph Outlet No :Bastam Dy-0001(weeds)		Photograph Outlet No :Bastam Dy-0019(ok)
		
Photograph Outlet No :Bastam Dy-0037(weeds)		Photograph Outlet No :Bastam Dy-0055(weeds)

		
Photograph Outlet No :Bastam Dy-0073(weeds)		Photograph Outlet No :Bastam Dy-0089(weeds)
		
Photograph Outlet No :Bastam Dy-073A(broken)		Photograph Outlet No :Deoband Mr-0001(weeds)

		
Photograph Outlet No :Deoband Mr-0019(weeds)		Photograph Outlet No :Deoband Mr-0027(broken)
		
Photograph Outlet No :Ghalauli Mr-0002(broken)		Photograph Outlet No :Ghalauli Mr-0014(weeds)

		
Photograph Outlet No :Rohana Mr-0002(WEEDS)		Photograph Outlet No :Rohana Mr-0019(WEEDS)
		
Photograph Outlet No :Rohana Mr-023A(WEEDS)		Photograph Outlet No :Bhayla Mr-0012(WEEDS)

		
Photograph Outlet No :Kulsath Mr-0006(WEEDS)		Photograph Outlet No :Mathura Mr-0015(WEEDS)
		
Photograph Outlet No :Pawati Mr-0016(WEEDS)		Photograph Outlet No :Luhari Dy-0017(WEEDS)

		
Photograph Outlet No :Luhari Dy-0071(WEEDS)		Photograph Outlet No :Charthawal Dy-0002(WEEDS)
		
Photograph Outlet No :Charthawal Dy-074B(BROKEN & WEEDS)		Photograph Outlet No :Khushropur Mr-0001(BROKEN)

		
Photograph Outlet No :Khushropur Mr-003A(BROKEN)		Photograph Outlet No :Mubarikpur Mr-006A(BROKEN)
		
Photograph Outlet No :Tikaula Mr-004A(BROKEN)		Photograph Outlet No :Kheda Dy-0002(WEEDS)

		
Photograph Outlet No :Kheda Dy-010A(WEEDS)		Photograph Outlet No :Ulheda Mr-0002(WEEDS)
		
Photograph Outlet No :Ulheda Mr-0017(BROKEN)		Photograph Outlet No :RtMohammadpur Dy-0002(BROKEN)

		
Photograph Outlet No :RtMohammadpur Dy-0082(WEEDS)		Photograph Outlet No :RtMohammadpur Dy-080A(WEEDS)
		
Photograph Outlet No :Main Baseda Dy-0001(BROKEN)		Photograph Outlet No :Main Baseda Dy-045A(BROKEN)

		
Photograph Outlet No :Purkala Mr-0001(BROKEN)		Photograph Outlet No :Purkala Mr-012A(BROKEN)
		
Photograph Outlet No :Akbarpur Mr-023A(BROKEN)		Photograph Outlet No :Mawana Mr-0042(BROKEN)

		
Photograph Outlet No :Bhaisa Mr-001A(SEDIMAITATION)		Photograph Outlet No :Sadhan Mr-0013(SEDIMAITATION)
		
Photograph Outlet No :Allipur Mr-0009(SEDIMAITATION)		Photograph Outlet No :Dhikauli Dy-0013(OK)

		
Photograph Outlet No :Dhikauli Dy-020A(Weeds)		Photograph Outlet No :Darveshpur Mr-0001(broken)
		
Photograph Outlet No :Darveshpur Mr-005A(broken)		Photograph Outlet No :Ramnagar Mr-0023(CUT BY FARMAR)

		
Photograph Outlet No :Garh Mukteshwar Dy-0001(weeds)		Photograph Outlet No :Garh Mukteshwar Dy-0006(sedimaintation)
		
Photograph Outlet No :Garh Mukteshwar Dy-074A(sedimaintation)		Photograph Outlet No :Parikshitgarh Mr-0003(weeds)

		
Photograph Outlet No :Laliyana Mr-0001(broken)		Photograph Outlet No :Laliyana Mr-005A(broken)
		
Photograph Outlet No :Lodhipur Mr-0001(broken)		Photograph Outlet No :Lodhipur Mr-013A(sedimaintation)

		
Photograph Outlet No :Upper Parikshitgarh Garh Dy-0001(SEDIMAINTATION)		Photograph Outlet No :Upper Parikshitgarh Garh Dy-141A(SEDIMAINTATION)
		
Photograph Outlet No :Radhna Mr-0013(WEEDS)		Photograph Outlet No :Paswada Mr-006A(BROKEN)

		
Photograph Outlet No :Govindpuri Mr-0018(WEEDS)		Photograph Outlet No :Govindpuri Mr-027T(BROKEN)
		
Photograph Outlet No :Diwai Mr-0018(BROKEN)		Photograph Outlet No :Tigri Mr-006A(BROKEN)

		
Photograph Outlet No :Datiyana Mr-011A(BROKEN)		Photograph Outlet No :Sena Mr-0018(BROKEN)
		
Photograph Outlet No :Ladpur Mr-0010(BROKEN)		Photograph Outlet No :Sathla-1 Mr-0001(BROKEN)

		
Photograph Outlet No :Sathla-1 Mr-012A(WEEDS)		Photograph Outlet No :ShakhBaira Dy-0001(SEDIMAINTATION)
		
Photograph Outlet No :ShakhBaira Dy-025A(WEEDS)		Photograph Outlet No :Shahjahanpur Mr-0001(BROKEN)

		
Photograph Outlet No :Shahjahanpur Mr-006A(WEEDS)		Photograph Outlet No :Buklana Mr-001C(BROKEN)
		
Photograph Outlet No :Fattapur Mr-015T(BROKEN)		Photograph Outlet No :Baksar Mr-0016 (WEEDS)

		
Photograph Outlet No :Baksar Mr-008A(BROKEN)		Photograph Outlet No :Basi Mr-0001(WEEDS)
		
Photograph Outlet No :Basi Mr-0015(BROKEN)		Photograph Outlet No :Lower Parikshitgarh Dy-0001(SEDIMAINTATION)

		
Photograph Outlet No :Lower Parikshitgarh Dy-078A(BROKEN)		Photograph Outlet No :Syana Mr-0001(WEEDS)
		
Photograph Outlet No :Giraura Mr-025A(BROKEN &WEEDS)		Photograph Outlet No :Khanauda Dy-0001(BROKEN &WEEDS)

		
Photograph Outlet No :Khanauda Dy-014A(WEEDS)		Photograph Outlet No :Charaura Dy-0001(WEEDS)
		
Photograph Outlet No :Charaura Dy-062A(WEEDS)		Photograph Outlet No :Bagsara Mr-0013(BROKEN)

		
Photograph Outlet No :Bagsara Mr-0036(BROKEN)		Photograph Outlet No :Bupada Mr-0002(BROKEN)
		
Photograph Outlet No :Phulat Mr-0003(SEDIMAINTATION)		Photograph Outlet No :Phulat Mr-0039(WEEDS)

		
Photograph Outlet No :Jalalpur Mr-0001(BROKEN)		Photograph Outlet No :Pali-1 Mr-0019(BROKEN)
		
Photograph Outlet No :Bhuni Mr-0001(BROKEN)		Photograph Outlet No :Bhuni Mr-0051(WEEDS)

		
Photograph Outlet No :Khatauli Dy-0001(BROKEN)		Photograph Outlet No :Khatauli Dy-0058(BROKEN)
		
Photograph Outlet No :Tyodi Mr-0009(BROKEN)		Photograph Outlet No :Tyodi Mr-0023(BROKEN)

		
Photograph Outlet No :RtBhola Dy-0001(WEEDS)		Photograph Outlet No :RtBhola Dy-0078(WEEDS)
		
Photograph Outlet No :Bharapur Mr-0001(BROKEN)		Photograph Outlet No :Bhaneda Mr-0002(WEEDS)

		
Photograph Outlet No :Gyaspur Dy-0039(BROKEN)		Photograph Outlet No :Gyaspur Dy-0049(CUT BY FARMER)
		
Photograph Outlet No :Nangla-1 Mr-0004(BROKEN)		Photograph Outlet No :Ujheda Mr-0033(WEEDS)

		
Photograph Outlet No :Sultanpur Mr-0026(WEEDS)		Photograph Outlet No :Kalanjari Mr-0023(WEEDS)
		
Photograph Outlet No :Nurpur Mr-0012(BROKEN)		Photograph Outlet No :Aghera Mr-0002(SEDIMAINTAION)

		
Photograph Outlet No :Aghera Mr-0018(BROKEN)		Photograph Outlet No :Sherpur Mr-0001(WEEDS)
		
Photograph Outlet No :Sherpur Mr-0025(WEEDS)		Photograph Outlet No :Mau Mr-0001(WEEDS)

		
Photograph Outlet No :Mau Mr-0004(BROKEN)		Photograph Outlet No :Mau Mr-0006(WEEDS)
		
Photograph Outlet No :Mau Mr-0008(SEDIMAINTATION)		Photograph Outlet No :Mau Mr-0010(WEEDS)

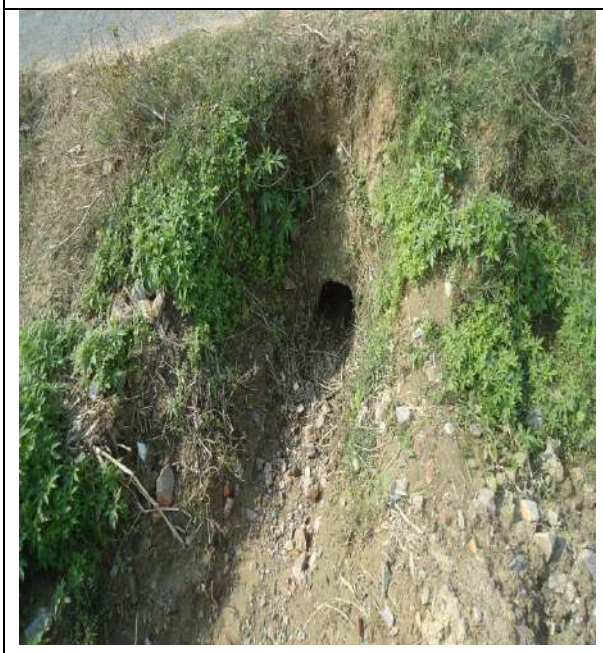
CIRCLE- 3

		
Photograph Outlet No :Hathras Br-0010(Broken)		Photograph Outlet No :Hathras Br-0019(Broken)
		
Photograph Outlet No Hathras Br-0032(Weeds And Silt)		Photograph Outlet No :Hathras Br-0045(Weeds & Silt)

		
Photograph Outlet No :Hathras Br-0063(Broken)		Photograph Outlet No :Hathras Br-0087(Broken)
		
Photograph Outlet No :Hathras Br-099A(Broken & Weeds)		Photograph Outlet No :Kinwasa Mr-0011(Damaged)

		
Photograph Outlet No :Kinwasa Mr-0029 (Damaged)		Photograph Outlet No : Jujhar Dy-0014 (Good)
		
Photograph Outlet No : Jujhar Dy-0033 (Broken)		Photograph Outlet No : Gonda Dy-0013 (Weeds And Slit)

		
Photograph Outlet No :Gonda Dy-0038(Broken)		Photograph Outlet No : Jagner Mr-0005(Damaged)
		
Photograph Outlet No : Busguai Mr-0008(Broken)		Photograph Outlet No : Busguai Mr-0019(Broken)

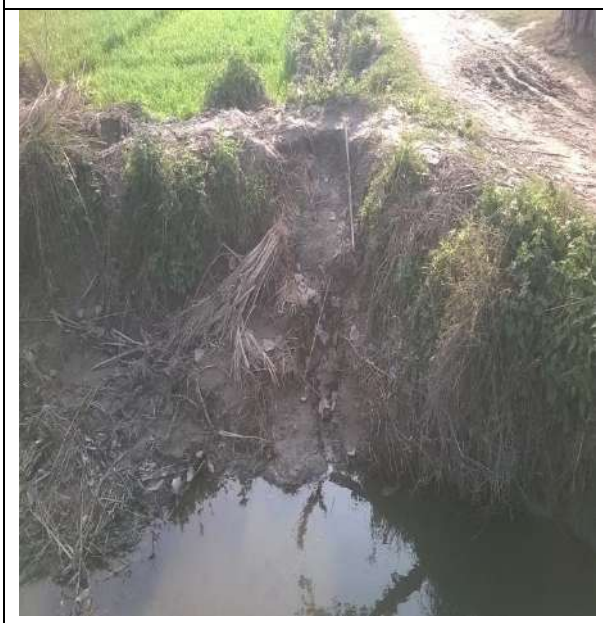
		
Photograph Outlet No : Gonda Dy-0038(Broken)		Photograph Outlet No : Jagner Mr-0005(Damaged)
		
Photograph Outlet No : Busguai Mr-0008(Broken)		Photograph Outlet No : Busguai Mr-0019(Broken)

		
Photograph Outlet No : Tauchhigarh Dy-0013 (Broken)		Photograph Outlet No : Tauchhigarh Dy-0040 (Damaged)
		
Photograph Outlet No :Tuksan Mr-0011 (Broken)		Photograph Outlet No :Darshana Mr-0004 (Weeds & Broken)

		
Photograph Outlet No :Kotta Mr-0011 (Broken)		Photograph Outlet No: Everunpur Mr-0008 (Broken)
		
Photograph Outlet No : Bhisana Dy-0019 (Damaged)		Photograph Outlet No: Gijrauli Dy-0006 (Damaged)

		
Photograph Outlet No: Gijrauli Dy-0017 (Broken)		Photograph Outlet No: Badhhar Mr-0006 (Siltation)
		
Photograph Outlet No :Laadpur Mr-0003 (Weeds & Damaged)		Photograph Outlet No :Laadpur Mr-0010 (Damaged)

		
Photograph Outlet No :Pahadpur Mr-0006 (Damaged)		Photograph Outlet No :Pahadpur Mr-0015 (Damaged)
		
Photograph Outlet No :Khirwa Mr-0004 (Blocked By Villegers)		Photograph Outlet No : Khirwa Mr-0014 (Weeds)

		
Photograph Outlet No : Sahpau Dy-0030 (Damaged)		Photograph Outlet No : Sahpau Dy-0092 (Damaged)
		
Photograph Outlet No :Khirwa Mr-0004 (Blocked By Villegers)		Photograph Outlet No : Khirwa Mr-0014 (Weeds)

		
Photograph Outlet No : Paisai Mr-0014 (Blocked By Villegers)		Photograph Outlet No :Usmanpur Mr-0011 (Damaged)
		
Photograph Outlet No : Aanwalkheda Mr-0011 (Broken)		Photograph Outlet No : Naglabel Mr-0009 (Damaged)

		
Photograph Outlet No : Aitmadpur Mr-0013 (Damaged)		Photograph Outlet No :Chawali Mr-0011 (Blocked By Villegers)
		
Photograph Outlet No :Shakrauli Dy-0008 (Weeds)		Photograph Outlet No : Shakrauli Dy-0052 (Broken)

		
Photograph Outlet No :Gothua Mr-0003 (Damaged)		Photograph Outlet No : Sona Mr-0012 (Damaged)
		
Photograph Outlet No : Barhan Dy-0037 (Damaged)		Photograph Outlet No :Aharan Mr-0007 (Damaged)

		
Photograph Outlet No : Devkheda Mr-0006 (Damaged)		Photograph Outlet No :Ghirauli Mr-0011 (Damaged& Weeds)
		
Photograph Outlet No : Hazratpur Mr-0009 (Damaged)		Photograph Outlet No : Lower Mat-0107 (Damaged)

		
Photograph Outlet No :Bankaner Mr-0013 (Damaged)		Photograph Outlet No : Khera Mr-0022 (Damaged)
		
Photograph Outlet No : Bajna Dy-0010 (Damaged)		Photograph Outlet No : Parsauli Mr-0011 (Damaged)

		
Photograph Outlet No : Jarara Dy-0039 (Weeds)		Photograph Outlet No : Bera Mr-0008 (Blocked By Villegers)
		
Photograph Outlet No : Surir Mr-0023 (Weeds)		Photograph Outlet No : Mursan Dy-0035 (Damaged)

		
Photograph Outlet No : Harota Mr-0016 (Blocked By Villagers)		Photograph Outlet No :Dhandhisra Mr-0005 (Good)
		
Photograph Outlet No : Gorai Dy-0034 (Silt and Damaged)		Photograph Outlet No : Bhdrawan Mr-0004 (Damaged)

		
Photograph Outlet No : Sadabad Dy-0042 (Blocked by villagers)		Photograph Outlet No : AayraKhera Dy-0012 (Blocked By Villagers)
		
Photograph Outlet No : Bhurasani Mr-0006 (Damaged and silt)		Photograph Outlet No : Karil Mr-0008 (Weeds)

		
Photograph Outlet No : Banka Mr-0005 (Weeds)		Photograph Outlet No :Meer Mr-0008 (Weeds)
		
Photograph Outlet No : Mahawan Dy-0028 (Weeds)		Photograph Outlet No :Kataila Mr-0008 (Damaged)

		
Photograph Outlet No : Pindari Mr-0007 (Blocked By villegers)		Photograph Outlet No : Kursanda Dy-0044 (Weeds)
		
Photograph Outlet No : Sihaura Mr-0007 (Damaged)		Photograph Outlet No : Pachawar Mr-0009 (Sedimentation)

		
Photograph Outlet No : Jugsana Dy-0051 (Broken)		Photograph Outlet No : Byohi Mr-0006 (Damaged)
		
Photograph Outlet No : Radaui Mr-0024 (Damaged)		Photograph Outlet No : Semra Mr-0013 (Damaged)

		
Photograph Outlet No : Daghaita Dy-0026 (Weeds & Sedimentation)		Photograph Outlet No : Daghaita Dy-0081 (Weeds And Sedimentation)
		
Photograph Outlet No : Khandauli Dy-0025 (Weeds & Sedimentation)		Photograph Outlet No : Khandauli Dy-0054 (Damaged)

		
Photograph Outlet No : Durjiya Mr-0013 (Damaged)		Photograph Outlet No :Baldev Dy-0017 (Damaged)
		
Photograph Outlet No : Awareni Mr-0003 (Broken)		Photograph Outlet No : Awareni Mr-0020 (Siltation)

		
Photograph Outlet No : Awareni Mr-0040 (Siltation)		Photograph Outlet No :Aangai Mr-0010 (Broken)
		
Photograph Outlet No : Daulatpur Mr-0002 (Damaged & Siltation)		Photograph Outlet No :Daulatpur Mr-0020 (Damaged & Siltation)

		
Photograph Outlet No : Gadhsauli Mr-0020 (Broken)		Photograph Outlet No :Upper Mat-0007 (Damaged& Siltation)
		
Photograph Outlet No : Upper Mat-0005 (Broken)		Photograph Outlet No : Upper Mat-0043 (Damaged And Siltation)

		
Photograph Outlet No : Upper Mat-0065 (Damaged & Siltation)		Photograph Outlet No : Khandera Mr-0008 (Sedimentation)
		
Photograph Outlet No : Basantpur Mr-0007 (Damaged & Weeds)		Photograph Outlet No :Badoda First Dy-0018 (Damaged & Weeds)

		
Photograph Outlet No :Badoda First Dy-0047(Siltation)		Photograph Outlet No :Mahalpur Mr-0010 (Damaged& Weeds)
		
Photograph Outlet No :Hamidpur Mr-0005 (Damaged & Weeds)		Photograph Outlet No :Chuhadpur Mr-0005 (Damaged)

		
Photograph Outlet No :Rasoolpur Dy-0022 (Weeds)		Photograph Outlet No : Nithari Mr-0005 (Siltation)
		
Photograph Outlet No :Beechhat Mr-0004 (Weeds)		Photograph Outlet No :Hasanpur Dy-0012 (Damaged)

		
Photograph Outlet No :Hasanpur Dy-0048 (Damaged)		Photograph Outlet No : Faridpur Mr-0006 (Damaged)
		
Photograph Outlet No : Chiti Mr-0012 (Damaged)		Photograph Outlet No : Dewtta Mr-0008 (Broken)

		
Photograph Outlet No : Masauta Mr-0012 (Damaged)		Photograph Outlet No : Mahaipa Mr-0007 (Sedimentation)
		
Photograph Outlet No :Noorpur Mr-0006 (Broken)		Photograph Outlet No : Jewar Dy-0014 (Damaged)

		
Photograph Outlet No : Jewar Dy-0038 (Damaged)		Photograph Outlet No : Jewar Dy-0059 (Weeds &Sendimetation)
		
Photograph Outlet No :Jewar Dy-0075 (Damaged)		Photograph Outlet No : Jewar Dy-0096 (Damaged)

		
Photograph Outlet No : Jewar Dy-0129 (Damaged)		Photograph Outlet No : Sunpeda Mr-0008 (Damaged)
		
Photograph Outlet No : Talda Dy-0020 (Weeds & Siltation)		Photograph Outlet No : Thhasrana Mr-0005 (Weeds & Damaged)

		
Photograph Outlet No : Bhatta Mr-0006 (Damaged& Sedimentation)		Photograph Outlet No :Bhatta Mr-0017 (Broken)
		
Photograph Outlet No :Chandpur Mr-0003 (Damaged & Sedimentation)		Photograph Outlet No : Raunija Mr-0002 (Weeds Siltation)

		
Photograph Outlet No : Rabupura Mr-0010 (Damaged& Sedimentation)		Photograph Outlet No :Falauda Mr-0010 (Broken)
		
Photograph Outlet No :Karauli Mr-0006 (Weeds & Siltation)		Photograph Outlet No : Karauli Mr-0017 (Weeds &Broken)

		
Photograph Outlet No : Dayanatpur Mr-0009 (Weeds)		Photograph Outlet No :Veerampur Mr-0004 (Broken)
		
Photograph Outlet No :Veerampur Mr-0017 (Damaged And Sedimentation)		Photograph Outlet No : Ranhera Mr-0005 (Damaged & Sedimentation)

		
Photograph Outlet No : Kishorpur Mr-0007 (Broken)		Photograph Outlet No : Shivara Mr-0005 (Weeds)
		
Photograph Outlet No : Shivara Mr-0015 (Weeds)		Photograph Outlet No : Shivara Mr-0025 (Weeds)

		
Photograph Outlet No :Bajauta Dy-0010 (Weeds)		Photograph Outlet No : Bajauta Dy-0019 (Weeds)
		
Photograph Outlet No : Bajauta Dy-0033 (Siltation)		Photograph Outlet No : Bajauta Dy-0051 (Weeds)

		
Photograph Outlet No :Khajpur Mr-0005 (Siltation)		Photograph Outlet No : Chaurauli Mr-0008 (Weeds)
		
Photograph Outlet No :Jikarpur Mr-0004 (Siltation)		Photograph Outlet No :Jikarpur Mr-0013 (Damaged)

		
Photograph Outlet No : Jikarpur Mr-0022 (Weeds & Sedimentation)		Photograph Outlet No :Jattari Mr-0009 (Weeds)
		
Photograph Outlet No : Jattari Mr-0020 (Sedementation)		Photograph Outlet No : Jattari Mr-0031 (Weeds)

		
Photograph Outlet No : Jattari Mr-0055 (Sedimentation)		Photograph Outlet No : Karanpur Mr-0008 (Weeds)
		
Photograph Outlet No : Utasani Mr-0018 (Sedimentation)		Photograph Outlet No :Utasani Mr-0025 (Sedimentation)

		
Photograph Outlet No :Utasani Mr-0036 (Weeds)		Photograph Outlet No : Madak Mr-0009 (Weeds)
		
Photograph Outlet No : Madak Mr-0021 (Broken)		Photograph Outlet No : Madak Mr-0030 (Siltation)

		
Photograph Outlet No : Gauraula Mr-0009 (Broken)		Photograph Outlet No : Kaulana Mr-0007 (Broken)
		
Photograph Outlet No :Kaulana Mr-0016 (Broken)		Photograph Outlet No :Utrawali Dy-0003 (Broken)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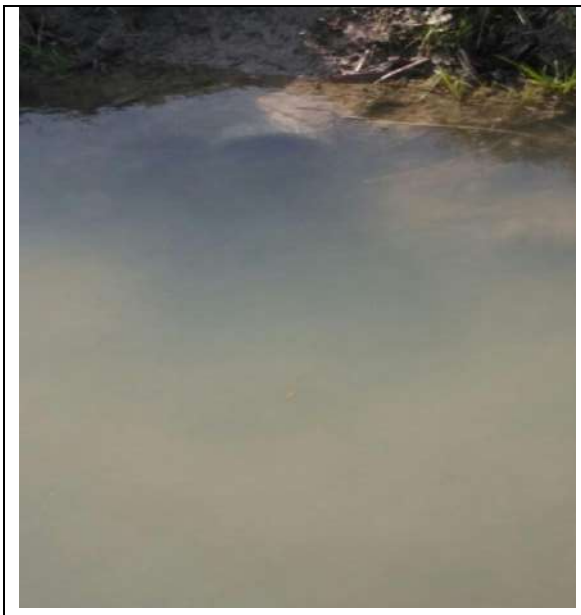
Photograph Outlet No : Jaitpur Mr-0008 (Siltation)		Photograph Outlet No : Jhajhar Mr-0013 (Damaged)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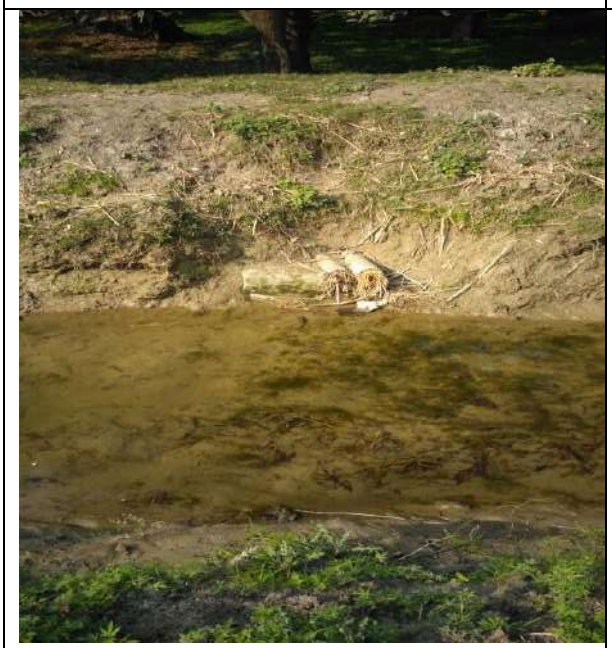		
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Photograph Outlet No : Lt Garhi Mr-0009 (Damaged & Weeds)		Photograph Outlet No : Kalakhuri Mr-0013 (Damaged)

		
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Photograph Outlet No : Lt Shadipur Mr-0003 (Weeds & Siltation)		Photograph Outlet No : Lt Shadipur Mr-0018 (Weeds & Siltation)

		
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Photograph Outlet No : Patlakheda Mr-0006 (Weeds)		Photograph Outlet No :Vair Dy-0009 (Siltation)

		
Photograph Outlet No :Hirnauti Mr-0011 (Weeds & Siltation)		Photograph Outlet No :Govindpur Mr-0010 (Damaged)
		
Photograph Outlet No :Salempur Mr-0009 (Weeds)		Photograph Outlet No : (Broken)

CIRCLE-4

		
Photograph Outlet No : Main Kalda Dy-0025(Damaged)		Photograph Outlet No : Main Kalda Dy-0075(Damaged And Weeds)
		
Photograph Outlet No : Main Kalda Dy-0104 (Damaged)		Photograph Outlet No : Main Kalda Dy-0119 (Damaged)

		
Photograph Outlet No : Main Kalda Dy-0141 (Damaged)		Photograph Outlet No : Main Kalda Dy-0163 (Damaged And Weeds)
		
Photograph Outlet No : Main Kalda Dy-0185 (Damaged And Weeds)		Photograph Outlet No: Khichra Mr-0017(Damaged And Weeds)

		
Photograph Outlet No : Khushk Mr-0009(Damaged And Weeds)		Photograph Outlet No : Ikla Dy-0046(Damaged)
		
Photograph Outlet No : Rt Kalda Dy-0035(Damaged)		Photograph Outlet No : Rt Kalda Dy-0079(Damaged)

		
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Photograph Outlet No : Dhoom Mr-0011(Damaged)		Photograph Outlet No : Kirachpur Mr-0011(Damaged And Weeds)

		
Photograph Outlet No : Sikandrabad Dy-0035(Weeds)		Photograph Outlet No : Sikandrabad Dy-0048 (Damaged)
		
Photograph Outlet No : Sikandrabad Dy-0066 (Siltation)		Photograph Outlet No : Sikandrabad Dy-0083 (Weeds)

		
Photograph Outlet No : Sikandrabad Dy-0094 (Damaged)		Photograph Outlet No : Sikandrabad Dy-0108(Damaged)
		
Photograph Outlet No : Pyawali Mr-0014(Weeds)		Photograph Outlet No : Achchheja Mr-0008(Damaged)

		
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Photograph Outlet No : Bighepur Mr-0007 (Weeds)		Photograph Outlet No : Bisahda Mr-0012 (Damaged)

		
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Photograph Outlet No : Bulandshahr Dy-091A (Damaged And Weeds)		Photograph Outlet No : Chandrawali Mr-0023 (Water Level Down)

		
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Photograph Outlet No : Dadri Mr-0033 (Siltation)		Photograph Outlet No : Dankaur Mr-0018 (Damaged And Weeds)

		
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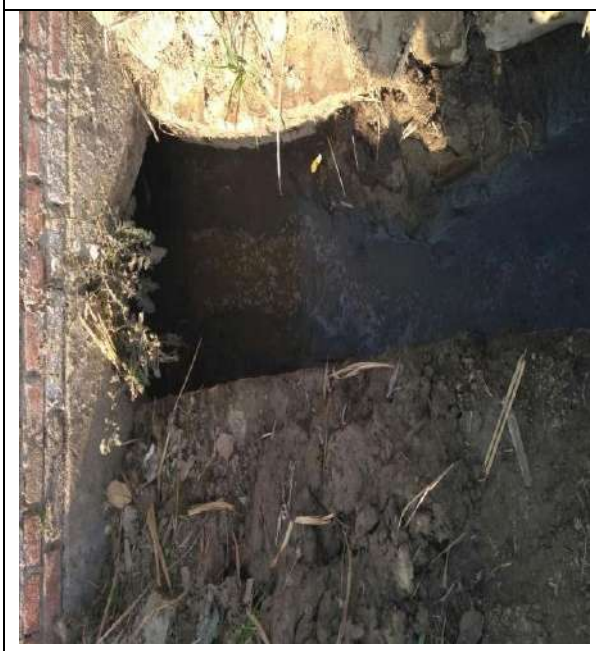		
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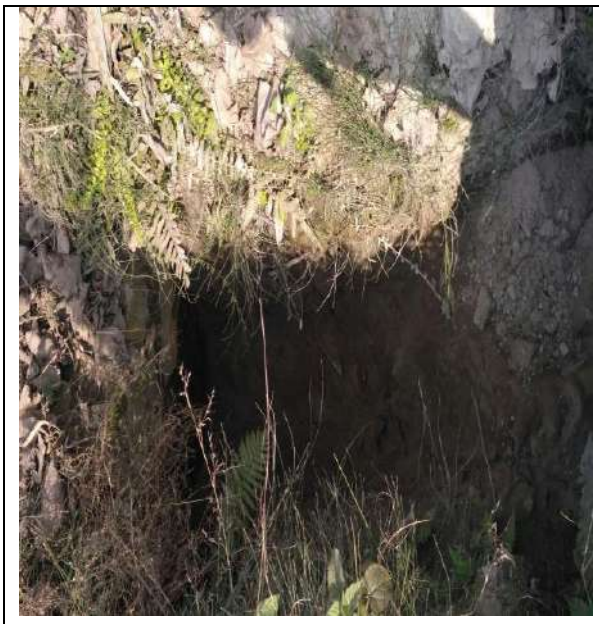		
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Photograph Outlet No : Kol Dy-0032 (Broken)		Photograph Outlet No : Kol Dy-0066 (Weeds)

		
Photograph Outlet No : Kol Dy-0126 (Damaged And Weeds)		Photograph Outlet No : Gangawali Mr-0024 (Damaged)
		
Photograph Outlet No : Faridpur Mr-0016 (Damaged And Weeds)		Photograph Outlet No : Dariyapur Mr-0008 (Damaged)

		
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Photograph Outlet No : Bauner Mr-0013 (Damaged)		Photograph Outlet No : Palda Dy-0034 (Weeds)

		
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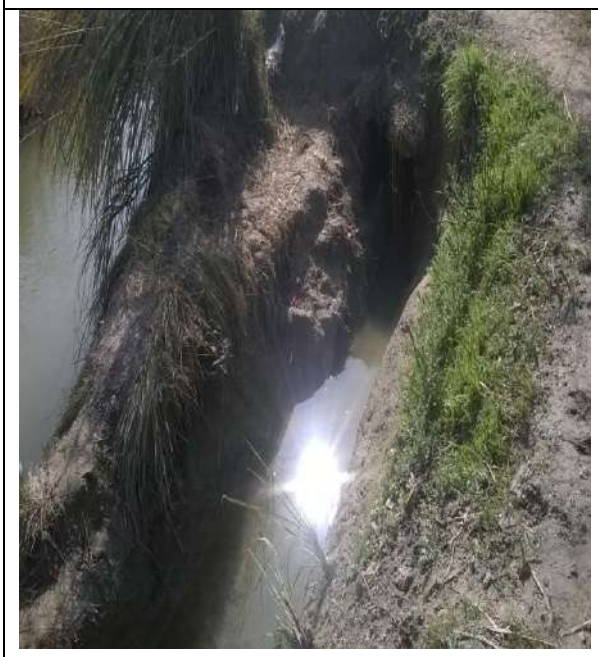		
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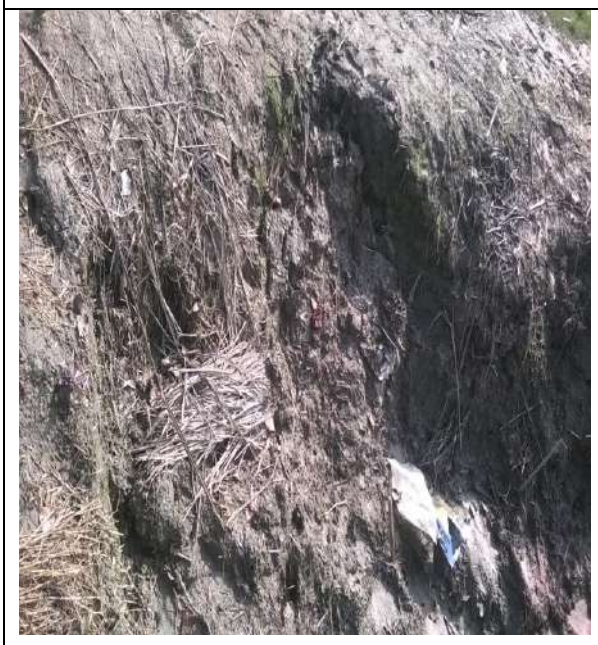		
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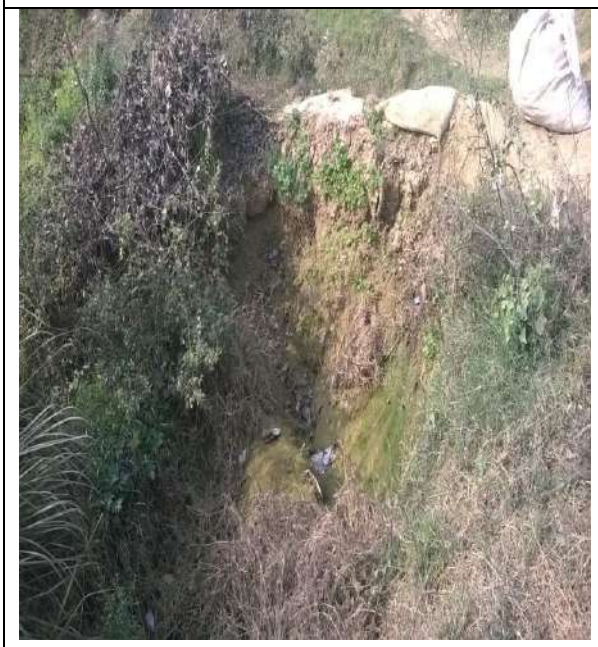		
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Photograph Outlet No : Tikri Mr-0021 (Weeds)		Photograph Outlet No : Tati Mr-0010 (Damaged)

		
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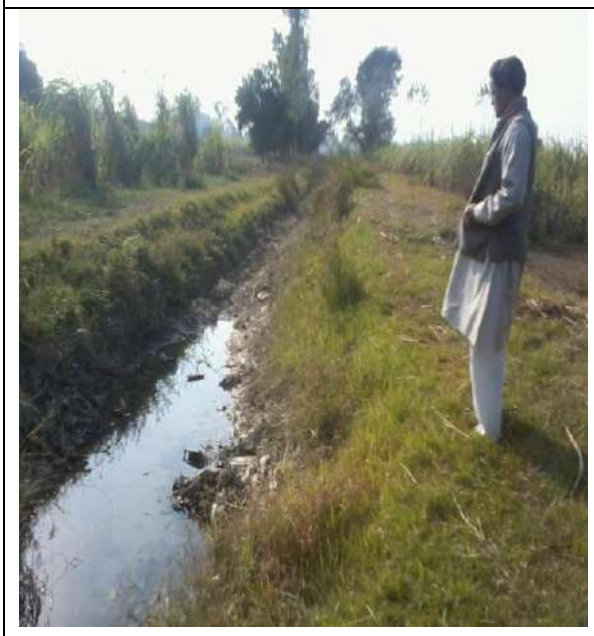		
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Photograph Outlet No : Kachaura Mr-0029 (Weeds)		Photograph Outlet No : Bhadwas Mr-0016 (Damaged)

		
Photograph Outlet No : Dhauri Mr-0011 (Damaged And Weeds)		Photograph Outlet No : AB Canal-0037 (Broken)
		
Photograph Outlet No : AB Canal-0080 (Weeds)		Photograph Outlet No : AB Canal-0112 (Damaged)

		
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Photograph Outlet No : Kaser Mr-0010 (Weeds)		Photograph Outlet No : Dharikpur Dy-0015 (Damaged And Weeds)

		
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Photograph Outlet No : Hardoi Dy-0012 (Weeds)		Photograph Outlet No : Hardoi Dy-0037 (Damaged)

		
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Photograph Outlet No : Jau Mr-0018 (Weeds)		Photograph Outlet No : Lodhipur Dy-0033 (Damaged)

		
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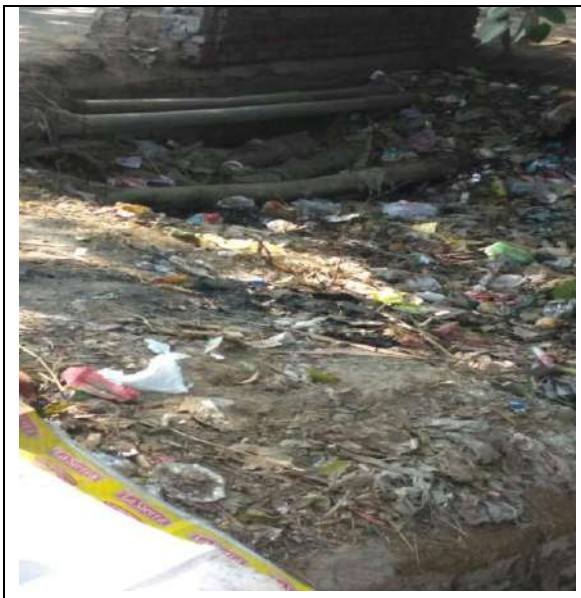		
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Photograph Outlet No : Haidar Nagar Dy-0012 (Damaged)		Photograph Outlet No : Ginauli Mr-0008 (Damaged And Weeds)
		
Photograph Outlet No : Sihauri Mr-0012 (Damaged And Weeds)		Photograph Outlet No : Payandapur Mr-0018 (Damaged And Weeds)

		
Photograph Outlet No : Malamai Mr-0024 (Weeds)		Photograph Outlet No : Pratappur Mr-0025 (Damaged)
		
Photograph Outlet No : Tatarpur Mr-0009 (Weeds)		Photograph Outlet No : Firozabad Dy-0003 (Damaged)

		
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Photograph Outlet No : Nagau Dy-0009 (Damaged And Weeds)		Photograph Outlet No : Nagau Dy-0015 (Damaged And Weeds)
		
Photograph Outlet No : Nagau Dy-0026 (Damaged And Weeds)		Photograph Outlet No : Jirauli Mr-0003 (Weeds)

Appendix-I

Farmer Interaction Format

Name:

Father's Name:

Village:

Canal Details:

Other Irrigation Source:

Crops Cultivated: Rabi:

Kharif

How many times you get canal water: Rabi:

Kharif:

Timely availability of water: Yes/ No

Specify

Adequate Availability of Water: Yes/ No

Specify

Was there visit of any official of Irrigation/ Agriculture Departments to the village in past 6 months:

Appendix II

Compliance of CWC Comments

S.No.	Comments	Compliance
1	The report should give a detailed diagnostic of the canal network. Gap reporting needs to be done RD/Chainage wise in the complete network with specific reasons for the gap supported by Satellite imagery/ Google Earth. The gap should be clearly marked on T diagram in red and the T diagram should have all the attributes like structures, etc.As per Scope of Work, the Agency has to give Command Area Map including canals, Canal Network diagram with all attributes attached and types of canal structures marked along with chainage. The Agency may be therefore, advised to reflect all items as per scope of work agreed upon.	Detailed command area and canal network map has been prepared by geo-referencing canal network as *.kml file which is based on Google earth. The broken/ affected outlets and canal network have been demarcated by different colours at their geographical location. All the attributes of canal network have been attached in *.kml file.
2	The status of outlets needs to be clearly mentioned (dry or wet). This needs to be corroborated with farmers interaction.	Dry outlets have been demarcated in *kml files. All other outlets are wet outlets (liable to receive irrigation water). Farmers also corroborated it during interaction.
3	Details of constitution of the core team that went to the field along with the State govt officials with whom the meeting was conducted needs to be incorporated in the report along with photographs.	Please refer to para 5.2 of the report for details. The relevant photographs have been given in para 8 of the report.
4	The methodology to assess the IPU should be given.	The data for IPU has been collected from the project officials on the basis of their records. Field functionaries record the area irrigated under his jurisdiction which is aggregated at higher levels upto project level.

5	Detailed command area map in Ao size clearly excluding the area/CCA being served by other Minor irrigation schemes within the command should be given.	Since the command area map based on Google earth is quite big and when attempted the print on A0 size it was pixlet and was not readable. Accordingly efforts were made and Grid has been formed on Command Area Map. The print of each grid is given alongwith Index map for easy readability. Since a large number of minor irrigation schemes exists in the command area, the same could not be demarcated .
6	Designed IPC vs actual IPC achieved alongwith reasons should be given.	Old DPRs could not be traced. As such designed IPC could not be sacertained. The IPC details as provided by project officials have been considered and indicated in the report.
7	Filled in schedules of Phase-I and Phase-Il should be parts of the reports.	The filled in schedule of Phase I and Phase II with relevant data are given as Annexure I and Annexure II in the report.
8	It is observed from initial 4 to 5 pages of the reports, the Agency is focussing on the Approach & Methodology etc rather than giving details of the project concerned. It would be better that these reports start by giving highlights on features of the project concerned along with agriculture & irrigation profiles of the districts/states being benefited by the project.	Project details including location, salient features, districts benefitted, command area map etc have been indicated in para 4 of the report.
9	It is noted that the most of the findings stated in the reports are based on the opinions taken from the State-Govts officials concerned instead of their own.	The findings are based on the field observations and discussions with various groups. The opinion of project officials was also considered while reporting.
10	Hydrologic analysis scenario may be carried out by collecting storage position of water for the five year under reference to correlate the same with the potential utilised and findings based thereon may be given.	The project is a run-off river project. The Potential utilized values were sought from project officials as per their records.

11	The Agency has reportedly met farmers but nothing has been pointed about their interactions/views in regard to potential utilized/working conditions in regard to availability of water to their fieids.The format devised by AFC for interaction with the farmers should be given.	Farmer's Interaction format has been given in Annexure-III. Outcome of discussions and interaction with the farmers has been considered while reporting. Broadly the farmers opined that timely adequate water is not available and the condition of distribution need improvement
12	It is observed that in some cases, the data of IPC & IPU at outlet level has been indicated as not maintained. In such cases, the Agency may be advised to give detail at least at Minor Level.	The data has been given upto outlet level.
13	The designed v/s actual cropping pattern should be given in the project command. The Agency may be advised to point out whether any change in the cropping patterns has occurred in the absence of nil/scanty rainfall (as stated in case of Fulzar-l project).	Designed cropping pattern is not available in the absence of DPR. Actual cropping pattern as provided by project officials on the basis of their records have been reported.
14	The Agency may be asked to give photographs of headworks/canal/distributary/minors wherever conditions are in dilapidated states.	Photographs are given in Para 8 of the report
15	Names of the two projects that were awarded later on to the Agency have not been mentioned correctly in draft reports of Sukla and Midnapur Canal (vide page 4 and page 3 respectively). These names should be (i) Sethiathope Anicut System and (ii) Mangalam.	NA
16	The general status of O&M of the project, funds being made available to the project authorities and expenditure being made may be provided.	Project officials reported that they are short of funds for O & M. Financial details not collected as per TOR
17	Abbreviations should be given in the beginning. Units in tables are missing.	As suggested, Symbols and Abbreviations have been given. Units in tables have been indicated appropriately.
18	Bed slope should be 1 in 500 instead of 500.	NA

19	Units in tables are missing.	Units in tables have been indicated appropriately.
20	The basis for naming the canals, distributaries, minors and outlets has not been given	The naming of canals, distributories, minors and outlets have been done by project officials as per their own norms
21	Para-wise description of scope of work should be given.	The uderstanding of Scope of work by AFC and the brief details are given in para 2 of the report
	Besides, you are also requested to do the verification of the data presented after carrying out the necessary arithmetical checks in Block No 7 of Phase I of the Schedule so that it is ensured that the data presented are internally consistent. This is required for payment of submission of data for Phase l.	Arithmatic Checks carried out suitably.

भारत सरकार Government of India
केन्द्रीय जल आयोग Central Water Commission
परियोजना प्रबोधन संगठन Project Monitoring Organisation
आयोजना एवं प्रगति निदेशालय Planning and Progress Directorate
*****
कमरा नं० 411 (द), सेवा भवन Room No. 411(S), Sewa Bhawan,
रामाकृष्णपुरम, नई दिल्ली - 110066 R.K. Puram, New Delhi-110066
फोन / फेक्स नं. 011-26109425
इमेल: ppdtecwc@gmail.com, ppdte@nic.in

To,
G.S.Yadav
AFC India Ltd.
B-19, Community Centre,
Janakpuri, New Delhi-110058

This has reference to your submission of the draft reply of Fulzar-I, Sukla, Pairi and Midnapure projects. The said reports were discussed in the meeting of Monitoring Committee for Pilot Census and many short comings were observed. The same are annexed as Annexure I.

You are requested to kindly submit the draft final report accordingly.

एस. के. राजन
14/7/17
(एस. के. राजन)
निदेशक (आ० एवं प्र०)

संलग्नक : यथोक्त

Annexure I

i. The report should give a detailed diagnostic of the canal network. Gap reporting needs to be done RD/Chainage wise in the complete network with specific reasons for the gap supported by Satellite imagery/ Google Earth. The gap should be clearly marked on T diagram in red and the T diagram should have all the attributes like structures, etc.As per Scope of Work, the Agency has to give Command Area Map including canals, Canal Network diagram with all attributes attached and types of canal structures marked along with chainage. The Agency may be therefore, advised to reflect all items as per scope of work agreed upon.

ii. The status of outlets needs to be clearly mentioned (dry or wet). This needs to be corroborated with farmers interaction.

iii. Details of constitution of the core team that went to the field along with the State govt officials with whom the meeting was conducted needs to be incorporated in the report along with photographs.

iv. The methodology to assess the IPU should be given.

v. Detailed command area map in Ao size clearly excluding the area/CCA being served by other Minor irrigation schemes within the command should be given.

vi. Designed IPC vs actual IPC achieved alongwith reasons should be given.

vii. Filled in schedules of Phase-I and Phase-II should be parts of the reports.

viii. It is observed from initial 4 to 5 pages of the reports, *the Agency is focussing on the Approach & Methodology etc rather than giving details of the project concerned.* It would be better that these reports start by giving highlights on features of the project concerned along with agriculture & irrigation profiles of the districts/states being benefited by the project.

ix. It is noted that the most of the findings stated in the reports are based on the opinions taken from the State-Govts officials concerned instead of their own.

x. Hydrologic analysis scenario may be carried out by collecting storage position of water for the five year under reference to correlate the same with the potential utilised and findings based thereon may be given.

xi. The Agency has reportedly met farmers but nothing has been pointed about their interactions/views in regard to potential utilized/working conditions in regard to availability of water to their fields.**The format devised by AFC for interaction with the farmers should be given.**

xii. It is observed that in some cases, the data of IPC & IPU at outlet level has been indicated as *not maintained.* In such cases, the Agency may be advised to give detail at least at Minor Level.

xiii. The designed v/s actual cropping pattern should be given in the project command. The Agency may be advised to point out whether any change in the cropping patterns has occurred in the absence of nil/scanty rainfall (as stated in case of Fulzar-I project).

xiv. The Agency may be asked to give photographs of headworks/canal/distributary/minors wherever conditions are in dilapidated states.

xv. Names of the two projects that were awarded later on to the Agency have not been mentioned correctly in draft reports of Sukla and Midnapur Canal (vide page 4 and page 3 respectively). These names should be (i) Sethiathope Anicut System and (ii) Mangalam.

xvi. The general status of O&M of the project, funds being made available to the project authorities and expenditure being made may be provided.
xvii. Abbreviations should be given in the beginning.
xviii. Bed slope should be 1 in 500 instead of 500.
xix. Units in tables are missing.
xx. The basis for naming the canals, distributaries, minors and outlets has not been given.
xxi. Para-wise description of scope of work should be given.

Fulzar I

i. Storage position of the reservoir for the year in which maximum IPU was achieved should be given.
ii. In the column of location, what is the meaning of B.
iii. How volumetric measurement has been done for ungated outlets.

Midnapore

i. On page 15 and 59 CCA given is different.
ii. Cropping pattern is not given.
iii. It is not stated whether the river is perennial or not.

Besides, you are also requested to do the verification of the data presented after carrying out the necessary arithmetical checks in Block No 7 of Phase I of the Schedule so that it is ensured that the data presented are internally consistent. This is required for payment of submission of data for Phase I.