REPORT ON
PILOT CENSUS OF FULZAR-I 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	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	Sub distributary
SLD	Single Line Diagram
SMr	Sub minor
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 counteracting the tendency to excessive scour.

b) A structure built at the outlet of a channel where certain minimum depth of flow 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 deposited 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) upto 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 distributory offtakes.

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 evapotranspiration 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 conveyance 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 up to the end of the water courses or the last point in the water delivery system up to 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 utilzation 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 up to 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.

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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 Progress achieved by CWC: CWC has selected 8 projects covered in the Phase-I for collecting inventory-details. The list of 8 selected projects is as below:

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.

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

Subsequently, CWC assigned two more projects to AFC India Limited for carrying out the Pilot Census Survey.

1	Mangalam	Medium	South	Kerala
2	Sethiatope Anicut System	Major	South	Tamilnadu

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 upto 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

Fulzar-I irrigation project is situated in District Jamnagar of Gujarat State. Jamnagar is located in Saurashtra region of western Gujarat. The location of the project is shown in **Fig. 4.1.**

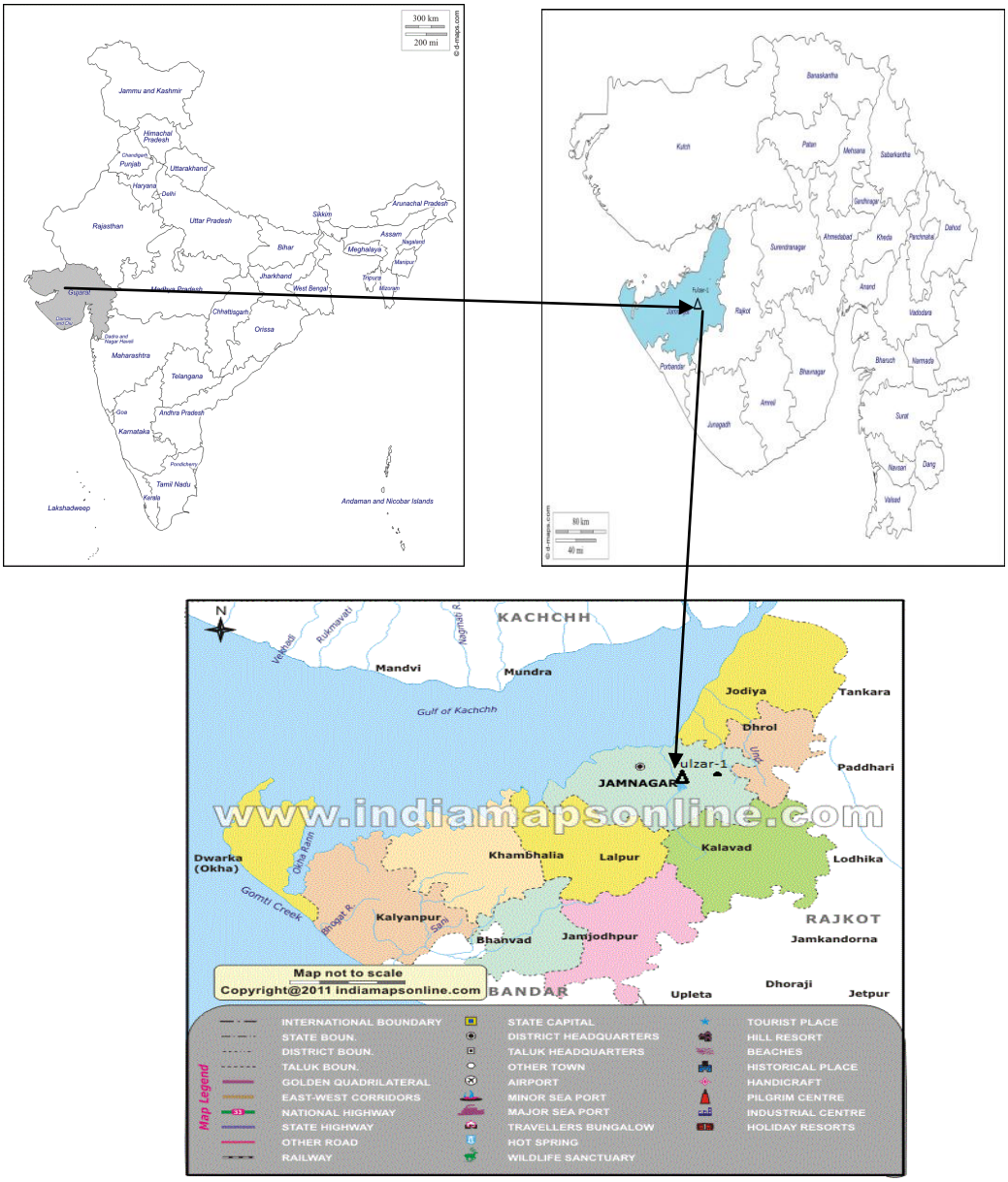

Fig 4.1 Location Map of Fulzar-1 in Gujarat

Profile of Jamnagar District

The district has 10 talukas of which the major ones are Jamnagar (District Headquarters), Jodiya, Okha, and Khambhaliya. The district is famous for its brass products, tie-dyed (bandhani) fabric and handicrafts. India's first marine national park and the famous Dwarkadhish temple built in 16^{th} century is located in Okha. Geographical location of the district is 68.57^{o} to 70.37^{o} East Longitude and 21.42^{o} to 22.57^{o} North Latitude. Temperature varies between 42^{o}C (Maximum) and 10^{o}C (Minimum). Average rainfall is 554 mm. Geographical area is 14125 km^2. District Headquarter is Jamnagar city. Population of the district was about 1.91 million as per 2001 Census. Population density was 111 persons per km^2 with sex ratio of 949 females per 1000 males. Literacy rate was 49.70% and Languages spoken are Gujarati, Hindi and English. Seismic Zone is Zone IV.

In agriculture, Jamnagar is second largest producer of oilseeds in Gujarat producing about 36119 metric Tonnes Oilseeds, 1.42 lakh MT of fruits and vegetables. Major vegetables produced in Jamnagar are Onion, Tomatoes, potatoes, Cauliflower and cluster beans. District is third largest producer of Garlic in Gujarat producing about 69303 MT of Garlic. Major fruit crops of the district are papaya, mango, chiku etc. The district is also third largest producer of groundnut in Gujarat state. Other crops produced are Cereals, Pulses and Cotton.

The salient features of the project have been collected and given below:

Name of the Project	Fulzar – l Irrigation Scheme, Gujrat
Type of Project	Storage
Category of Project	Medium
Name of Basin	Und
Start of Project	1956
End of Project	1961
Districts Benefitted	Jamnagar
Year of Commencement of Project	1956
Year of Completion	1961
Address of Project Headquarters	Ex.Engr. Jamnagar Irrigation Division, Jamnagar, Gujarat PWD Delo K.V. Road, District –

	Jamnagar 0288-2670688, 2555723 Asst. Engineer, Irrigation Subdivision -2 Geeta Lodge Building, Near Old Railway Station, Jamnagar- 361001. 0288-2670608
Number of Head Regulators	2
Location of head regulators	Left Bank, Right Bank
CCA of the project as per DPR	2032
Actual Irrigation Potential Created upto March 2013	1214
Location	Village : Golania, Taluka : Kalavad, District : Jamnagar, Gujarat
Purpose	Irrigation
Catchment Area	142 Km^2
Mean Annual Rainfall	508 mm
Stage of Completion	Completed
Reservoir	
Crest RL	24.69 m
Outlet Sill Level	17.98 m
Full Reservoir Level	24.69 m
Highest Flood Level	26.52 m
Top of Dam RL	29.26 m
River Bed RL	13.95 m
Submergence	428 Ha
Storage Capacity at FRL	11.36 MCM

Dead storage	0.14 MCM
Live storage	11.22 MCM
Length of Masonry Dam	304.8 m
Total Length of Dam	1233.0 m
Life of Reservoir	55 Years
Left Head Regulator chainage	289.56 m
Left HR Discharge	1.5 Cumec
Left HR Conduit pipe	0.90 m
Left HR Potential	916 Ha
Right HR Chainage	1272.54 m
Right HR Discharge	0.58 Cumec
Right HR Conduit pipe	0.60 m
Right HR Potential	298 Ha
Right Bank Canal	32.64 Km
Discharge Capacity	9.42 Cumec
GCA	3237 Ha
CCA Left	1533 Ha
CCA Right	499 Ha
CCA Total	2032 Ha
Villages Benefitted (Irrigation)	9

The Fulzar-I irrigation project comes under Jamnagar Irrigation Division under Rajkot Irrigation circle. The details of Canals and distributaries is given in following Table.

Table 5.1 : The details of Canals and Distributaries

S. No	Canal	Chainage (m)	Structure	Details	BW (m)	FSD (m)	FB (m)	Bed Slope (1 in m)	Discharge (Cumecs)
1	LBMC	2042	Direct Outlet		1.68	0.91	0.61	1500	1.4810
2	LBMC	2591	Direct Outlet		1.68	0.91	0.61	1500	1.4810
3	LBMC	3688	Direct Outlet		1.68	0.91	0.61	1500	1.4810
4	LBMC	4023	Direct Outlet		1.68	0.84	0.61	1500	1.2006
5	LBMC	4115	Direct Outlet		1.68	0.84	0.61	1500	1.2006
6	LBMC	4755	Direct Outlet		1.52	0.84	0.61	1000	1.1607
7	LBMC	5730	Direct Outlet		1.37	0.76	0.61	1000	0.9684
8	LBMC	6218	Direct Outlet		1.37	0.76	0.61	1000	0.9684
9	LBMC	6523	Direct Outlet		1.37	0.76	0.61	1000	0.9684
10	LBMC	7376	Direct Outlet		1.37	0.76	0.61	1000	0.6116
11	LBMC	9144	Direct Outlet		1.37	0.76	0.61	1000	0.6116
12	LBMC	12436	Outlet		0.91	0.38	0.46	500	0.2633
13	LBMC	1649	Outlet		0.91	0.38	0.46	500	0.2633
14	LBMC	13183	Outlet	Bifurcation	0.91	0.38	0.46	500	0.2633
15	LBMC	13289	Outlet		0.91	0.38	0.46	500	0.2633
16	LBMC	13594	Outlet		0.91	0.38	0.46	500	0.2633
17	LBMC	13929	Outlet		0.91	0.38	0.46	500	0.2633
18	LBMC	14234	Outlet		0.91	0.38	0.46	500	0.2633
19	LBMC	15210	Outlet		0.91	0.38	0.46	500	0.2633
	Distributary D1								
1	LB-D1	61	Outlet	2’ Fall	0.61	0.30	0.30	500	0.1458
2	LB-D1	181	Outlet	2’Fall	0.61	0.30	0.30	500	0.1458
3	LB-D1	335	Outlet		0.61	0.30	0.30	500	0.1458
4	LB-D1	792	Outlet		0.61	0.30	0.30	500	0.1458
5	LB-D1	1006	Outlet		0.61	0.30	0.30	500	0.1458
6	LB-D1	1097	Outlet		0.61	0.30	0.30	500	0.1458
7	LB-D1	1554	Tail Outlet		0.61	0.30	0.30	500	0.1458

	Distributary D2								
1	LB-D2	732	Outlet	1.5'Fall	0.61	0.30	0.30	500	0.1458
2	LB-D2	914	Outlet		0.61	0.30	0.30	500	0.1458
3	LB-D2	1097	Outlet		0.61	0.30	0.30	500	0.1458
4	LB-D2	1676	Outlet		0.61	0.30	0.30	500	0.1458
5	LB-D2	2134	Outlet		0.61	0.30	0.30	500	0.1458
6	LB-D2	2865	Outlet	3'Fall	0.61	0.30	0.30	500	0.1458
7	LB-D2	3018	Tail Outlet	3' Fall	0.61	0.30	0.30	500	0.1458
	Distributary D3								
1	LB-D3	1391	Outlet		0.76	0.38	0.46	500	0.2175
2	LB-D3	2377	Outlet	2'	0.76	0.38	0.46	500	0.2175
3	LB-D3	2987	Outlet		0.76	0.38	0.46	500	0.2175
4	LB-D3	3200	Outlet		0.76	0.38	0.46	500	0.2175
5	LB-D3	3353	Outlet	3'	0.76	0.38	0.46	500	0.2175
6	LB-D3	3505	Fall	4'	0.76	0.38	0.46	500	0.2175
7	LB-D3	3566	Fall	3'	0.76	0.38	0.46	500	0.2175
8	LB-D3	3658	Fall	4'	0.76	0.38	0.46	500	0.2175
9	LB-D3	3780	Fall	1'	0.76	0.38	0.46	500	0.2175
10	LB-D3	4023	Fall	2'	0.76	0.38	0.46	500	0.2175
11	LB-D3	4245	Fall	4'	0.76	0.38	0.46	500	0.2175
12	LB-D3	4267	Fall	2'	0.76	0.38	0.46	500	0.2175
	Distributary D4								
1	LB-D4	213	Outlet	2.65'Fall	0.61	0.30	0.30	500	0.1470
2	LB-D4	427	Outlet	3' Fall	0.61	0.30	0.30	500	0.1470
3	LB-D4	732	Outlet	4' Fall	0.61	0.30	0.30	500	0.1470
4	LB-D4	1097	Outlet	3' Fall	0.61	0.30	0.30	500	0.1470
5	LB-D4	1341	Outlet	2' Fall	0.61	0.30	0.30	500	0.1470
6	LB-D4	1554	Outlet		0.61	0.30	0.30	500	0.1470
7	LB-D4	1768	Cart Track crossing	2' Fall & Outlet	0.61	0.30	0.30	500	0.1470
8	LB-D4	1951	Outlet		0.61	0.30	0.30	500	0.1470
9	LB-D4	2195	Syphone 32"	1' Fall & Outlet	0.61	0.30	0.30	500	0.1470
10	LB-D4	2347	Outlet		0.61	0.30	0.30	500	0.1470
11	LB-D4	2804	Outlet		0.61	0.30	0.30	500	0.1470
	Distributary D5								
1	LB-D5	152	Outlet	3.25' fall	0.61	0.30	0.30	500	0.1470
2	LB-D5	305	Outlet	3.25' fall	0.61	0.30	0.30	500	0.1470
3	LB-D5	457	Outlet	3' fall	0.61	0.30	0.30	500	0.1470
4	LB-D5	701	Outlet	4' fall	0.61	0.30	0.30	500	0.1470
5	LB-D5	823	Outlet	3' fall	0.61	0.30	0.30	500	0.1470
6	LB-D5	1219	Outlet		0.61	0.30	0.30	500	0.1470

7	LB-D5	1402	Outlet	3’ fall	0.61	0.30	0.30	500	0.1470
8	LB-D5	1768	Outlet		0.61	0.30	0.30	500	0.1470
9	LB-D5	1951	Outlet	2’ fall	0.61	0.30	0.30	500	0.1470
10	LB-D5	2164	Outlet	1’ fall	0.61	0.30	0.30	500	0.1470
	Distributary D6								
1	LB-D6	305	Outlet		0.61	0.30	0.30	500	0.2260
2	LB-D6	853	Outlet	2’ Fall	0.61	0.30	0.30	500	0.2260
3	LB-D6	1067	Outlet	2’ Fall	0.61	0.30	0.30	500	0.2260
4	LB-D6	1372	Outlet		0.61	0.30	0.30	500	0.2260
5	LB-D6	1707	Outlet	1’ Fall	0.61	0.30	0.30	500	0.2260
6	LB-D6	1890	Outlet		0.61	0.30	0.30	500	0.2260
7	LB-D6	2103	Outlet	2’ Fall	0.61	0.30	0.30	500	0.2260
8	LB-D6	2347	Outlet		0.61	0.30	0.30	500	0.2260
9	LB-D6	2621	Outlet		0.61	0.30	0.30	500	0.2260
10	LB-D6	2896	Outlet	2’ Fall	0.61	0.30	0.30	500	0.2260
S. No	**Canal**	**Chainage (m)**	**Structure**	**Details**	**BW (m)**	**FSD (m)**	**FB (m)**	**Bed Slope (1 in m)**	**Discharge (Cumecs)**
1	RBMC	244	Outlet		1.52	0.61	0.61	1500	0.5777
2	RBMC	1615	Outlet		1.52	0.61	0.61	1500	0.5777
3	RBMC	1768	Outlet		1.52	0.61	0.61	1500	0.5777
4	RBMC	2149	Syphon	24”HP 16’	1.07	0.53	0.46	1000	0.3860
5	RBMC	2408	Outlet		1.07	0.53	0.46	1000	0.3860
6	RBMC	2707	Syphon	24”HP 16’	1.07	0.53	0.46	1000	0.3860
7	RBMC	2972	Syphon	24”HP 16’	1.07	0.53	0.46	1000	0.3860
8	RBMC	3353	Outlet		1.07	0.53	0.46	1000	0.3860
9	RBMC	3642	Syphon	24”HP 16’	1.07	0.53	0.46	1000	0.3860
10	RBMC	3871	Outlet		1.07	0.53	0.46	1000	0.3860
11	RBMC	4100	Syphon	24”HP 16’	1.07	0.53	0.46	1000	0.3860
12	RBMC	4267	Outlet		1.07	0.53	0.46	1000	0.3860
13	RBMC	4465	Syphon	24”HP 16’	1.07	0.53	0.46	1000	0.3860
14	RBMC	4785	Outlet		1.07	0.53	0.46	1000	0.3860
15	RBMC	5105	Outlet	Escape Gate	0.76	0.46	0.46	500	0.2175
16	RBMC	5334	Outlet	1’ fall	0.76	0.46	0.46	500	0.2175
17	RBMC	5563	Cart Trak	3’ Fall & outlet	0.76	0.46	0.46	500	0.2175

18	RBMC	5761	Outlet		0.76	0.46	0.46	500	0.2175
19	RBMC	5974	Outlet	18"HP24'	0.76	0.46	0.46	500	0.2175
20	RBMC	6309	Outlet		0.76	0.46	0.46	500	0.2175
21	RBMC	6553	Outlet	2' fall	0.76	0.46	0.46	500	0.2175
22	RBMC	6767	Outlet		0.76	0.46	0.46	500	0.2175
	Distributary D1								
1	RB-D1	213	Outlet	36"HP 360'	0.76	0.46	0.46	500	0.2175
2	RB-D1	396	Outlet	30" HP 4030" HP24''	0.76	0.46	0.46	500	0.2175
3	RB-D1	549	Outlet		0.76	0.46	0.46	500	0.2175
4	RB-D1	732	Outlet		0.76	0.46	0.46	500	0.2175
5	RB-D1	914	Outlet		0.76	0.46	0.46	500	0.2175
6	RB-D1	1128	Syphon	18: HP 32' & Outlet	0.76	0.46	0.46	500	0.2175
7	RB-D1	1250	Syphon	18" HP & Outlet	0.76	0.46	0.46	500	0.2175
8	RB-D1	1463	Outlet		0.76	0.46	0.46	500	0.2175
9	RB-D1	1707	Outlet	24" HP 16' & Outlet	0.76	0.46	0.46	500	0.2175
10	RB-D1	2073	Outlet		0.76	0.46	0.46	500	0.2175
11	RB-D1	2225	Syphon	18"HP 24' & Outlet	0.76	0.46	0.46	500	0.2175

Source: As per records at Project Office

Note:

LBMC: Left Ban Main Canal

RBMC: Right Bank Main Canal

BW : Bed Width of Canal

FSD : Full Supply Depth

FB : Free Board

Bed Slope: Longitudinal Slope of Canal say 1 in 500

Discharge: Discharge in Canal

HP : Hume Pipe

Inch : " and Foot : '

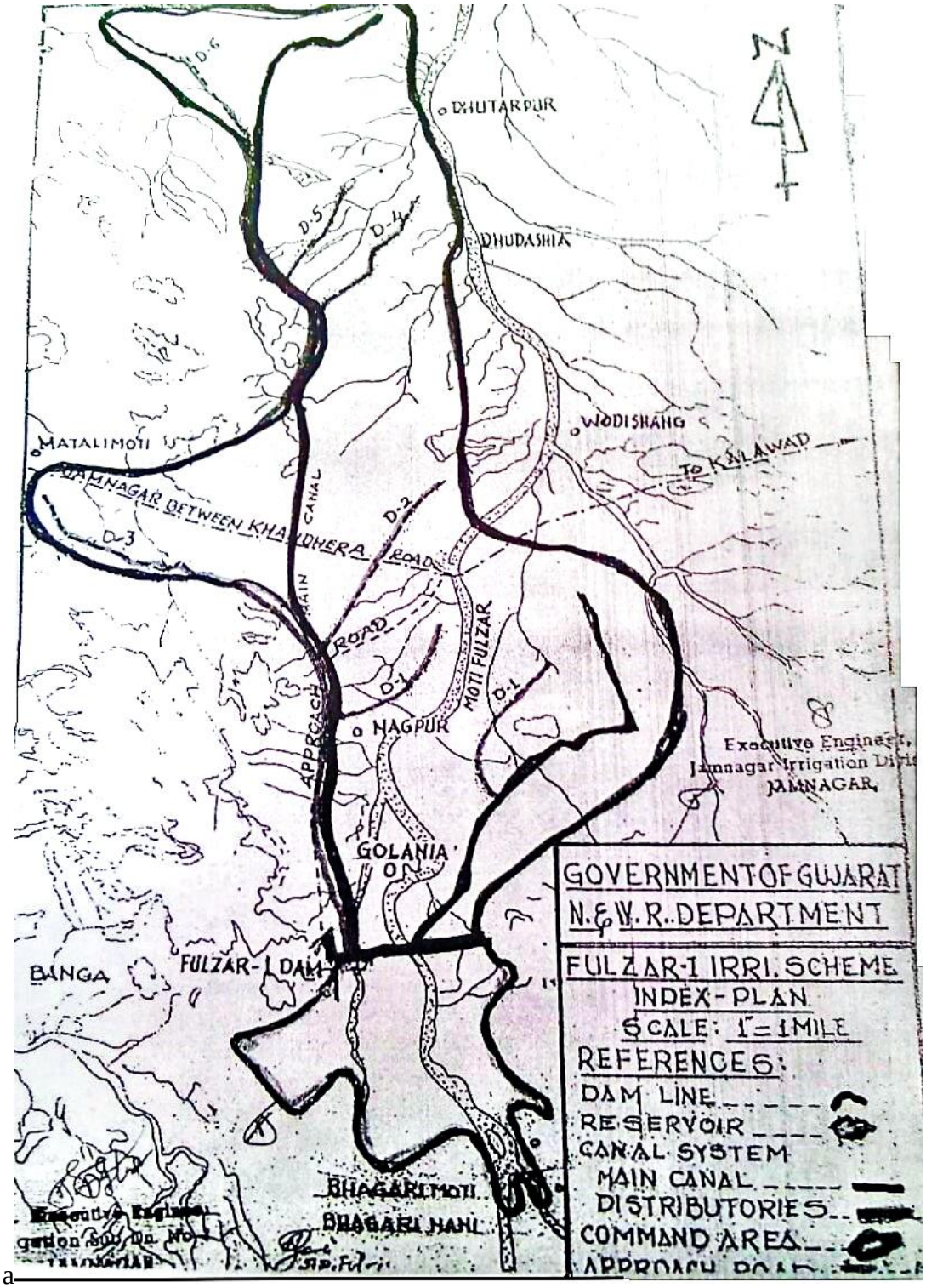

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Fig. 4.2 Index Map of Fulzar-I Irrigation Project provided by Fulzar-1 Project Office

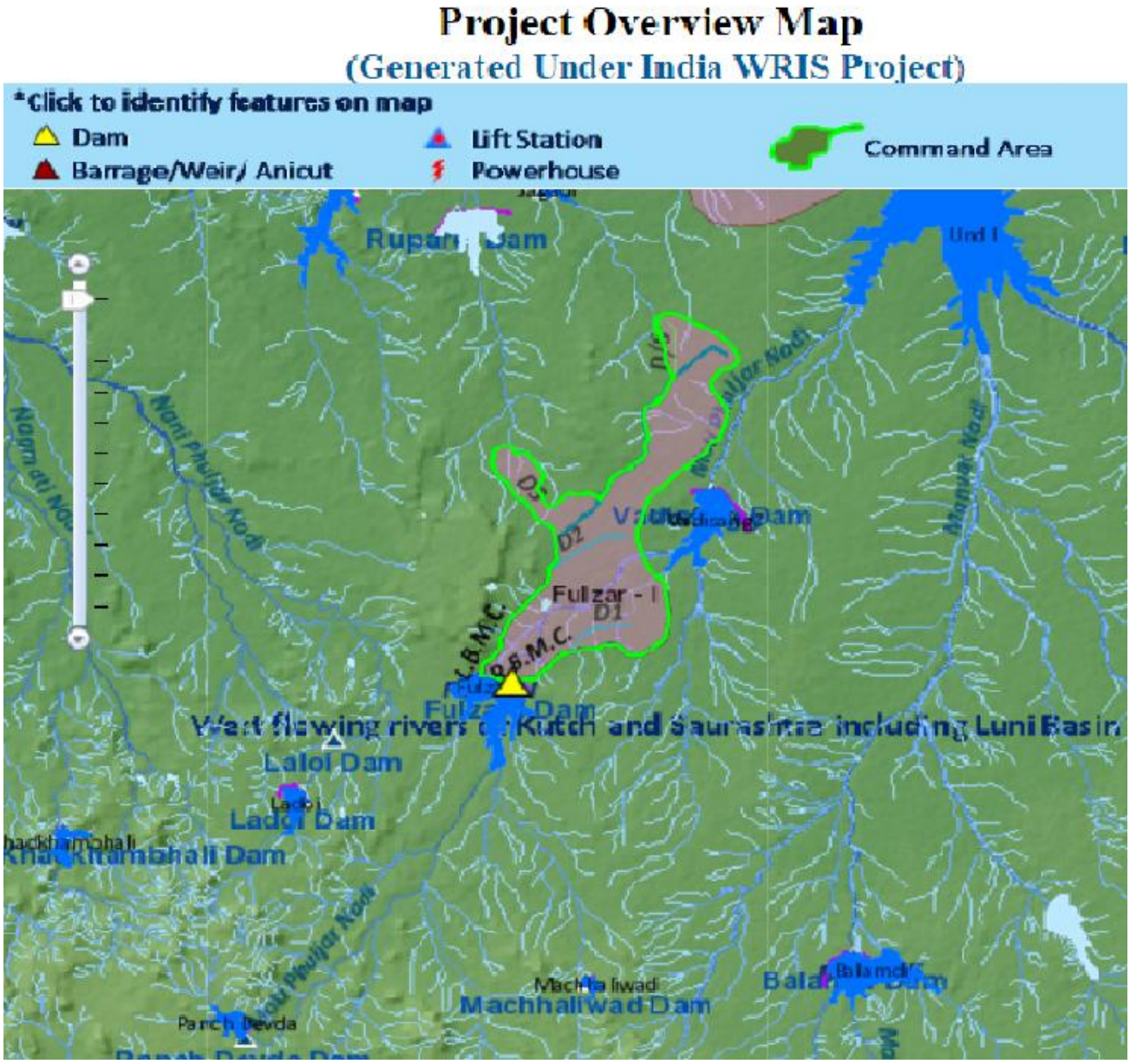


Fig. 4.3 Index Map of Fulzar-I Irrigation Project

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. In addition, 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. 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.** 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 2 and have discussions with state govt officials, farmers, water users 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 meters for the respective canal systems;

xi. The collected data will be geo-referenced to get the 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 on the whole (complete canal system).

xiii. The data collected under proforma 1 and 2 shall be shared by CWC with the key functionaries of the respective project authorities so as 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 them 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 also directed the field formations to help the team members during their visit to the project area.
- The core Team comprised of Dr. S.K. Jain, Mr. Deepak Kumar, Mr. Arvind Shukla and others. The core team interacted with senior officers of Irrigation Department at Jamnagar including Mr. V.B. Vakatar, Executive Engineer, Jamnagar Irrigation Division.
- 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 and accompany the field team for identification of canal network including outlets.
- 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.
- The team visited the project area and interacted with the concerned Executive Engineer and his team of officials at Fulzar-I, Jamnagar. 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- per-cent 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, outlets etc., was observed and recorded.
- The Team had an active interaction with the farmers and WUA members during the survey along the main canals and distributaries to discuss the state of affair of irrigation in the command area and to identify the constraints.
- Data was also collected from Office of the Deputy- Engineer at Jamnagar.
- The Team had an active interaction with the farmers during the survey along the main canal, distributaries and minors and also discussed the state of affairs of irrigation/ water availability in the command area so as to identify the constraints.
- The data so collected has been scrutinized 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

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 in **Fig. 6.1 to 6.9.**

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 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 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 is not available with project officials. However, salient features of the project were made available by project authorities. The designed details about IPC, Cropping Pattern and 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 base on field observations and discussions with various groups. The opinions of project officials were 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.

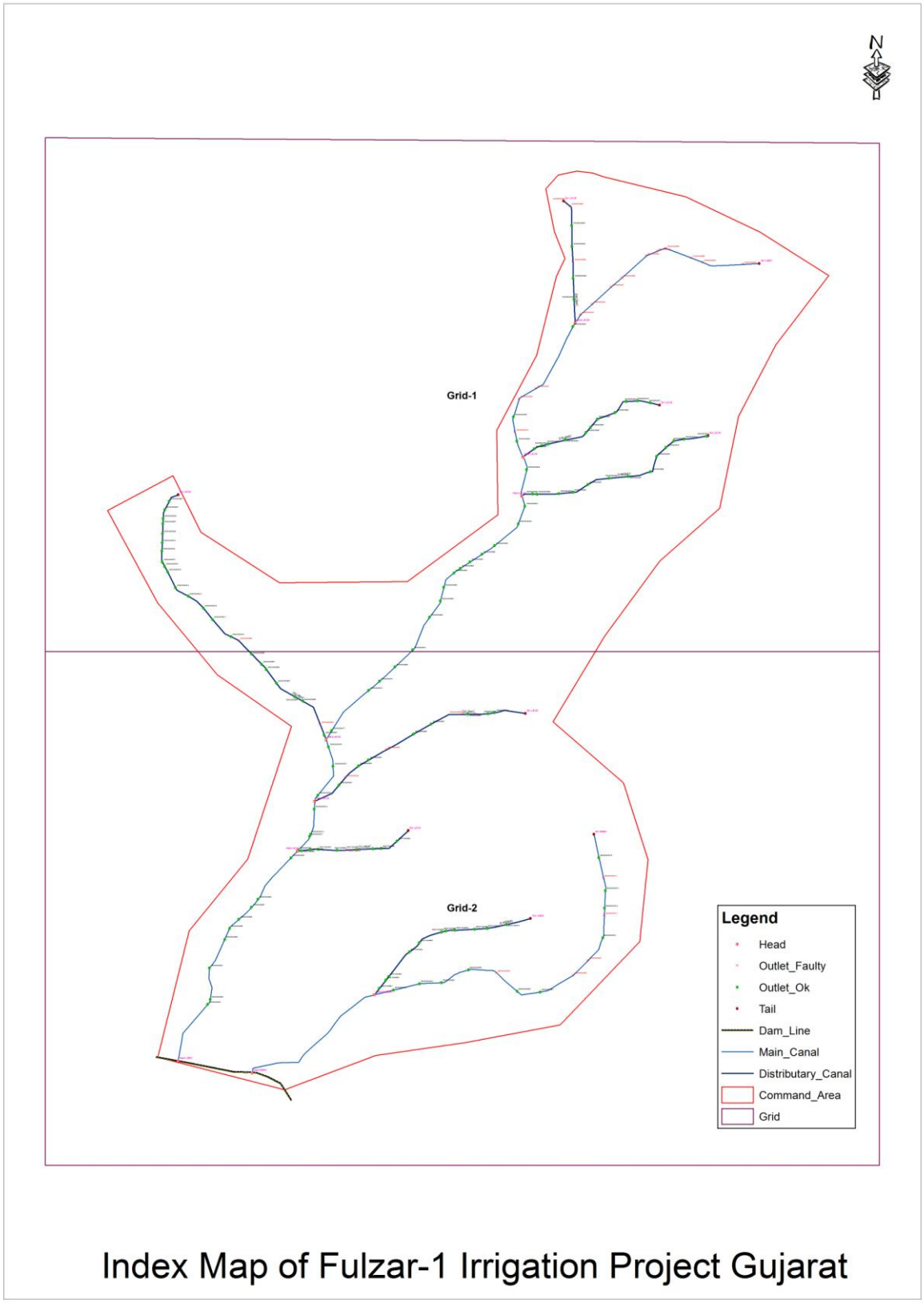


Fig. 6.1 Index Map of Fulzar-I Irrigation Project

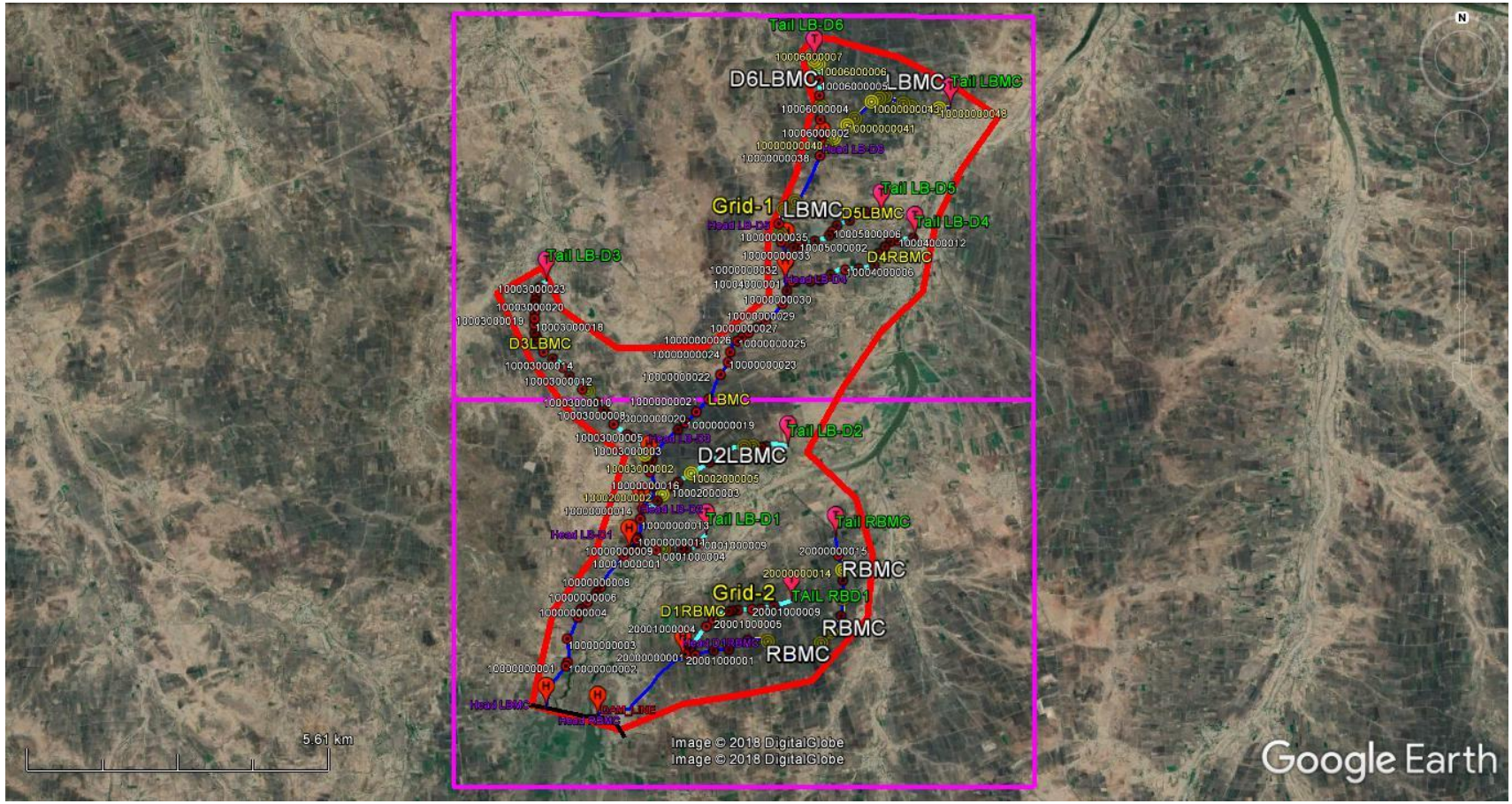


Fig. 6.2 Command Area Overview Map of Fulzar-I Irrigation Project with canal network and Outlets

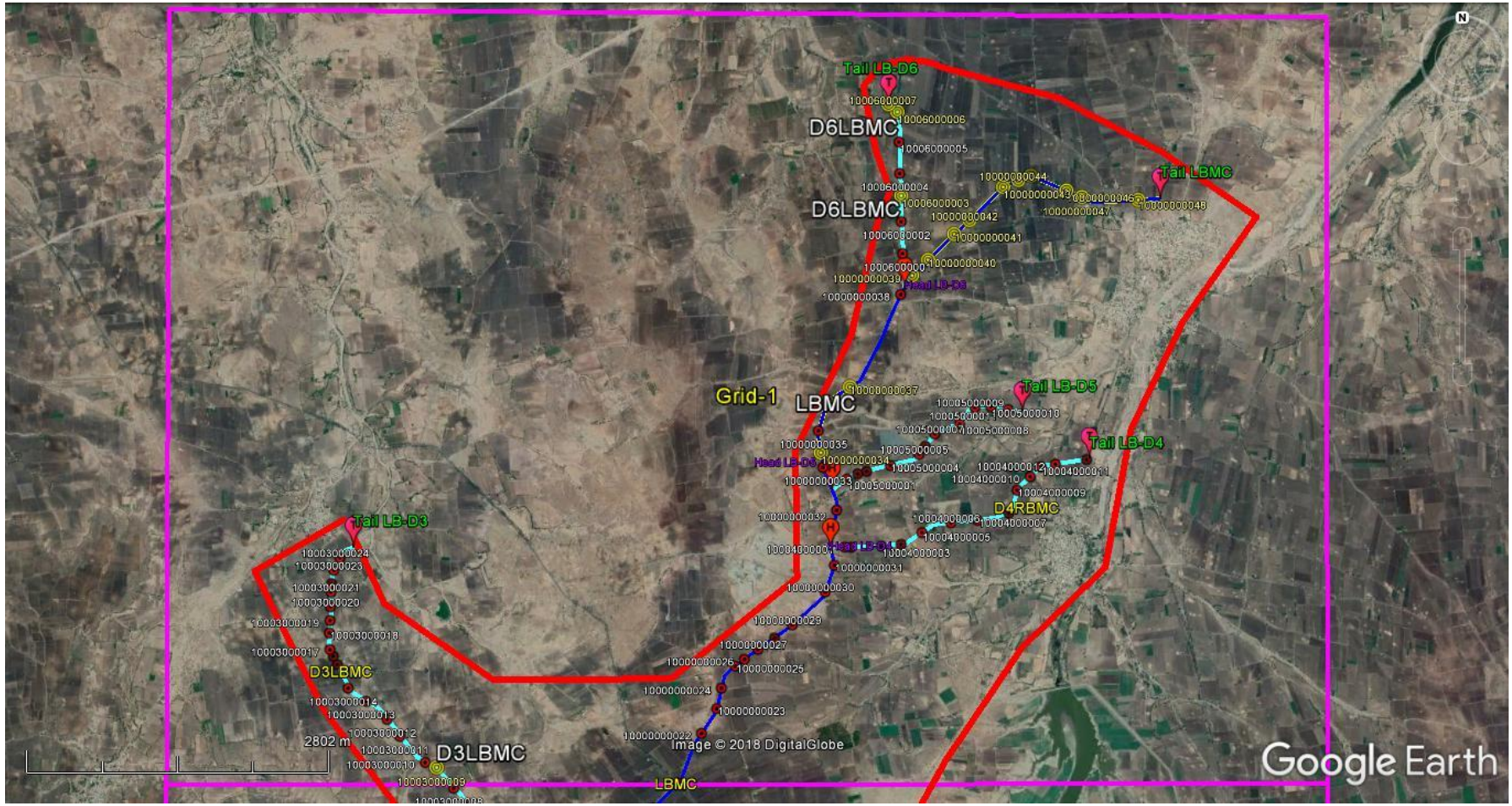


Fig. 6.3 Canal network and Outlets of Grid-1

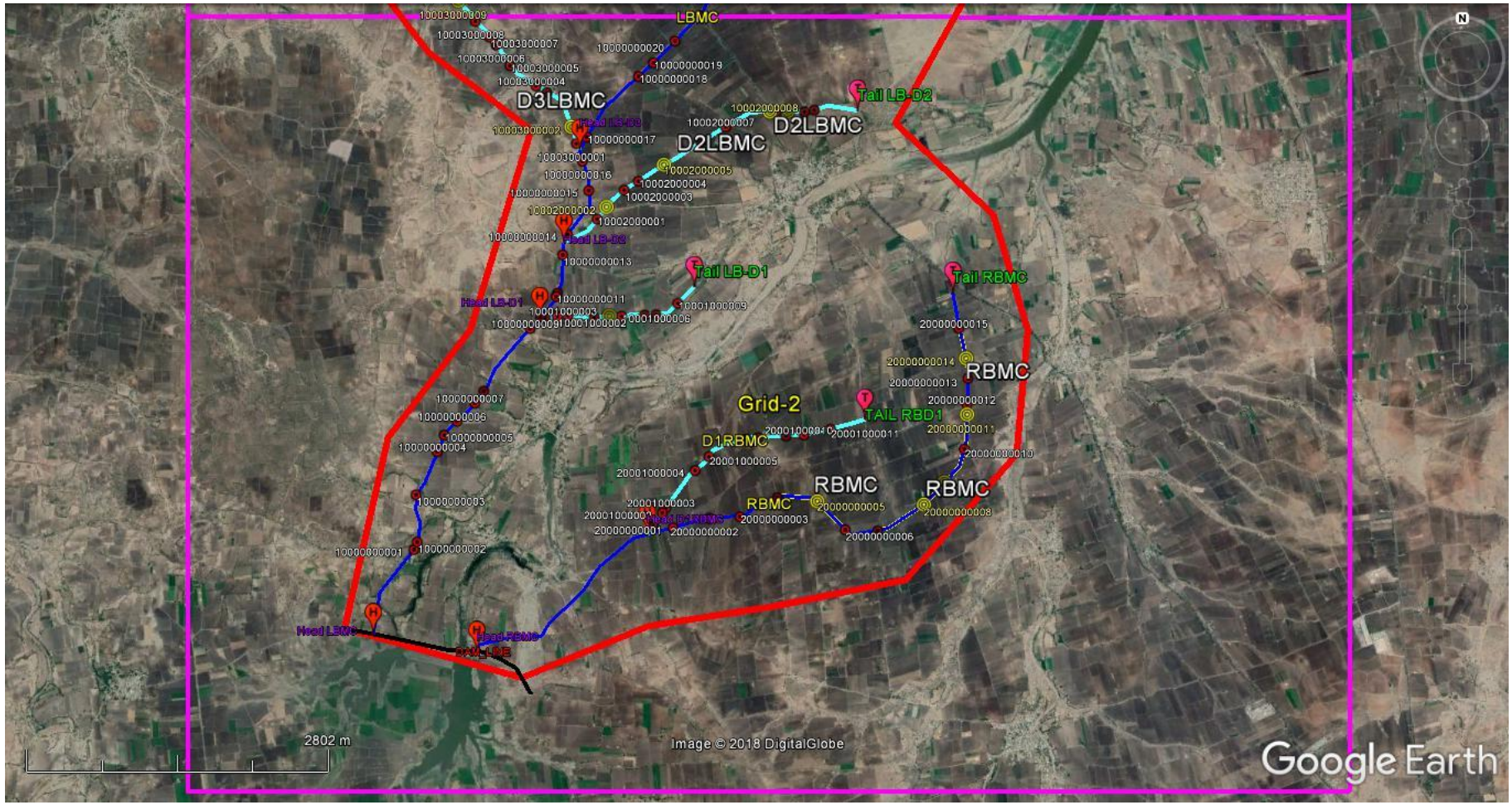


Fig. 6.4 Canal network and Outlets of Grid- 2

7. Results and Findings

- There is a wide gap between IPC ad IPU of the Fulzar-1 irrigation project. The data collected from the field and project functionaries revealed the gap of 720 ha out of 1214 ha being 59.31 %.
- There is practice of collecting revenue in advance according to farmer's demand including number of watering.
- Cropping Pattern during the year 2013-14 has been given in the following:

Season	Name of the Crop	Cropped Area (ha)
Kharif *	Ground Nut	81
	Cotton	343
	Juwar	202
	Bajara	202
	Kharif total	**828**
Rabi *	Wheat	323
	Rajko	162
	Rabi total	**485**
Total		**1313**

Note * the cropped area includes rainfed area also

- Different departments go by their own norms, i.e., Irrigation department go by release of water and estimates of area. The Revenue department goes by water amount/cess collected. Agriculture department goes by the area in which crops are raised. Thus, irrigation department values do not account for pilferage and call/ consider as system/ distribution loss.
- Head reaches farmers grow cash crop, abundant water crops and refuse to go for water efficient or low water consuming crops in next season. It gets aggravated due to non-availability of measuring devices/ practice of not measuring and keeping track of actual water flow through structures.
- There is no incentive to save precious water.
- Canal maintenance is lacking so weed growth and breakage occurs leading to obstruction in water reaching tail end. Water reaches up to tail when it is not required by farmers at higher reaches.

- Neglect and low annual budget for operation and maintenance (O& M) so the system deteriorates.
- Social reasons – Fishing vs Agriculture.
- Theft of water and revenue on mass scale.
- Data provided by the project authorities indicated a total of 102 outlets in the command area. The actual survey carried out by the field team using GPS device revealed a total of 150 outlets whose details have been appended in Annexure-II. Thus, there appears to be a mismatch between the data availability of outlets and actual ground situation. The brief details are indicated in Table 7.1 below:

Table 7.1 Details of Outlet Availability

S. No	Location	No. of Outlets	
		As per Records	Actual Field Survey
1	LBMC	11	48
2	LBMC -D1	10	9
3	LBMC-D2	07	12
4	LBMC-D3	06	24
5	LBMC-D4	13	13
6	LBMC-D5	11	11
7	LBMC-D6	10	7
8	RBMC	23	15
9	RBMC-D1	11	11
	Total	102	150

- It was observed that out of 150 outlets 27 outlets were found damaged/ broken and silted accounting for 18% outlets.
- During the survey, it was noticed that the earthen canal/ distributary in general are in order except at a few locations where weed growth and broken canal are resulting in blockage, leakage and seepage of water.

- The situation got aggravated due to scanty rainfall experienced during the recent years resulting in non-fulfilment of the reservoir and thus reduction of the supply of water
- The project functionaries reported that due to canal being unlined there is problem of seepage all along the canal.
- It was also reported that due to scanty rainfall adequate water is not received due to which water do not reach up to tail.
- Shortage of manpower and resources was also reported to be a major reason for gap in maintenance of canal system.
- Farmers reported that their main crop were cotton and oilseeds.
- The encroachment was observed on RBMC and the free flow is obstructed partially.
- There is no effective Warabandi system in the area.
- Water User Associations (WUA) are non-functional.
- There is lack of monitoring of canal operations.
- Water theft is also one of the important reasons of gap between Irrigation Potential Created and Irrigation Potential Utilized.
- Outlets 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 list of broken and affected outlets is given in **Table 7.2**.

Table 7.2 List of Affected Outlets

S. No.	Main canal	Distributary	Chainage_m	Outlet Sl. No.	Location (L/R)	Size of Outlet cm	Outlet ID *	Block / Tehsil	Village	Remarks
1	LBMC	NA	10500	034	R	22.86	10000000034	Jam Nagar	Dhutarpur	Broken
2	LBMC	NA	10980	036	R	22.86	10000000036	Jam Nagar	Dhutarpur	Broken
3	LBMC	NA	11238	037	B	22.86	10000000037	Jam Nagar	Dhutarpur	Broken
4	LBMC	NA	12435	039	B	22.86	10000000039	Jam Nagar	Dhutarpur	Broken
5	LBMC	NA	12644	040	B	22.86	10000000040	Jam Nagar	Dhutarpur	Broken
6	LBMC	NA	12985	041	B	22.86	10000000041	Jam Nagar	Dhutarpur	Broken
7	LBMC	NA	13177	042	L	22.86	10000000042	Jam Nagar	Dhutarpur	Broken
8	LBMC	NA	13615	043	R	22.86	10000000043	Jam Nagar	Dhutarpur	Broken
9	LBMC	NA	13772	044	R	22.86	10000000044	Jam Nagar	Dhutarpur	Broken
10	LBMC	NA	13900	045	B	22.86	10000000045	Jam Nagar	Dhutarpur	Broken
11	LBMC	NA	14255	046	R	15.24	10000000046	Jam Nagar	Dhutarpur	Broken
12	LBMC	NA	14412	047	B	22.86	10000000047	Jam Nagar	Dhutarpur	Broken
13	LBMC	NA	14948	048	B	22.86	10000000048	Jam Nagar	Dhutarpur	Broken
14	LBMC	LB-D1	650	005	R	15.24	10001000005	Kalavad	Haripar	Broken
15	LBMC	LB-D2	528	002	R	15.24	10002000002	Kalavad	Khandhera	Broken
16	LBMC	LB-D2	1195	005	R	15.24	10002000005	Kalavad	Khandhera	Broken
17	LBMC	LB-D2	2318	008	R	15.24	10002000008	Kalavad	Khandhera	Broken
18	LBMC	LB-D2	2481	010	R	15.24	10002000010	Kalavad	Khandhera	Broken
19	LBMC	LB-D3	228	002	R	15.24	10003000002	Kalavad	Moti Matli	Broken
20	LBMC	LB-D3	1845	009	R	15.24	10003000009	Kalavad	Moti Matli	Broken
21	LBMC	LB-D6	853	003	B	22.86	10006000003	Jam Nagar	Medi	Broken & Siltation
22	LBMC	LB-D6	1633	006	R	22.86	10006000006	Jam Nagar	Medi	Broken
23	LBMC	LB-D6	1745	007	B	22.86	10006000007	Jam Nagar	Medi	Broken & Siltation
24	RBMC	NA	3720	005	R	22.86	20000000005	Kalavad	Haripar	Broken
25	RBMC	NA	5186	009	L	22.86	20000000009	Kalavad	Haripar	Broken
26	RBMC	NA	5878	011	B	22.86	20000000011	Kalavad	Haripar	Broken
27	RBMC	NA	6400	014	R	22.86	20000000014	Kalavad	Haripar	Broken

Gap between IPC and IPU

There are no minors in this project. There are LBMC and RBMC in the project having distributaries with outlets supplying water for irrigation. Distributary-wise gap between IPC and IPU are given in **Table 7.3.**

Table 7.3 Gap between IPC and IPU in 2013-14 (in ha)

S. No.	Distributory	IPC	IPU	Gap (IPC– IPU)
1	LBMC	540.77	218.05	322.72
2	LB-D1	63.72	22.97	40.75
3	LB-D2	78.64	22.97	55.67
4	LB-D3	81.5	32.15	49.35
5	LB-D4	85.27	23.15	62.12
6	LB-D5	42.23	23.14	19.09
7	LB-D6	45.67	33.56	12.11
8	RBMC	196.31	83.95	112.36
9	RBMC-D1	80.40	34.15	46.25
	Total Gap	**1214.51**	**494.09**	720.42

8 Constraints/ Reasons for Gap

The study has revealed that the main reasons for the gap between IPC and IPU in the project are following:

- 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.
- Non-availability of required infrastructure such as Control/ measuring devices, broken outlets etc
- Frequent breaches
- IPU is reported on the basis of advance revenue collection. Subsequently, there is no monitoring as to who is withdrawing the water from the system.
- Irregular de-silting of distribution channels
- Operation &Maintenance budget being inadequate
- Excessive use of irrigation water many a times results in water-logging
- Farmers resort to flood irrigation.
- Lack of cooperation among farmers, villages 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
- Non-existence of effective functional WUAs
- Low technical exposure of the officials of Irrigation Department at grass root level.
- Modern Managerial 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
- Lack of coordination between line departments including CADA, Agriculture, Revenue etc.

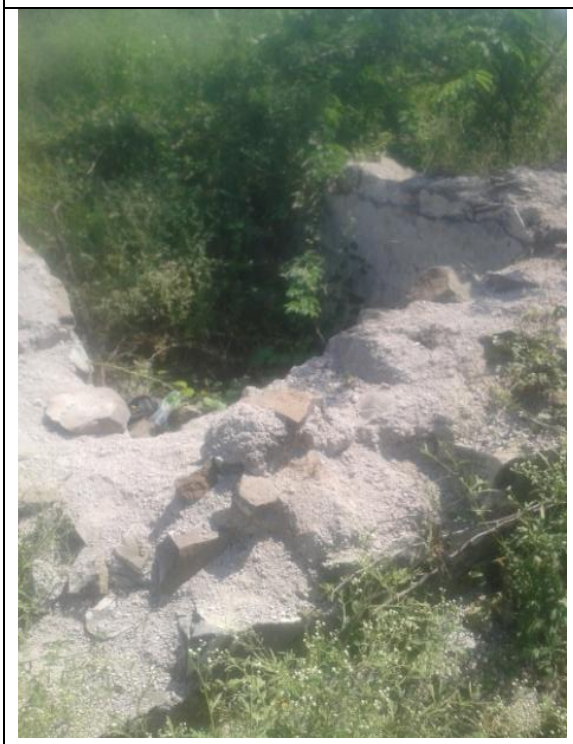
9. Recommendations:

- The Fulzar-I irrigation project was initiated in 1956 and completed in the year 1961. The system is in a dilapidated condition and needs restoration in the Headworks, distribution system, outlets etc.
- Five decades have elapsed and the data is 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.
- Proper 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.
- Adoption of PIM.
- Enhance role of Women in water management.
- Renovation of system is required. Selective lining of canal may be undertaken.
- Adequate budget should be provided for maintenance of the system.
- Night irrigation should be propagated to minimize evaporation losses.
- Practice of giving incentive for less water consuming crop cultivation should be given.
- Proper monitoring shall be enforced which is significantly lagging.
- Practice of advance collection of revenue result in disincentive to farmers due to cash crunch and deteriorate their economy, payment capacity etc. Practice of periodic payment may be adopted.
- Conveyance efficiency shall be enhanced by adopting selective lining of canal.
- Adequate budget and manpower should be provided for maintenance of the system.
- Proper third party monitoring system also needs to be evolved to keep a track of leakage and theft of water along with reach-wise performance at an interval of three years.

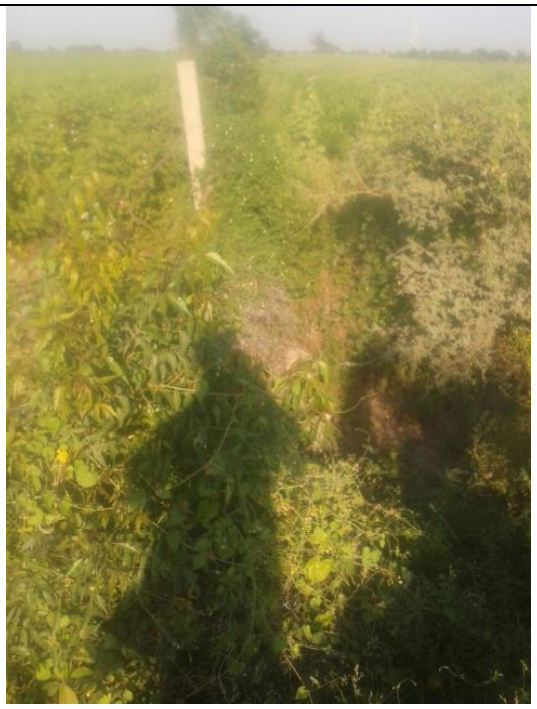
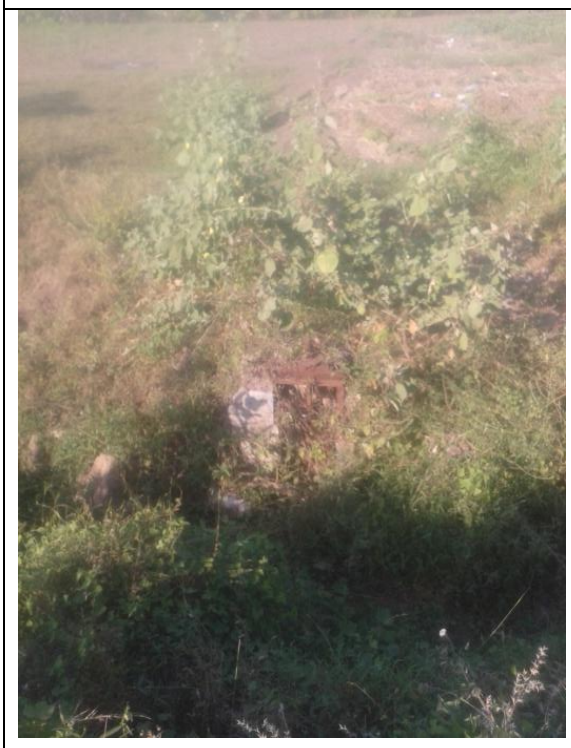
10. Photographs of Damaged/ Broken Outlets

		
Photograph of Outlet No.LBMC-34		Photograph of Outlet No.LBMC-36
		
Photograph of Outlet No.LBMC-37		Photograph of Outlet No.LBMC-39

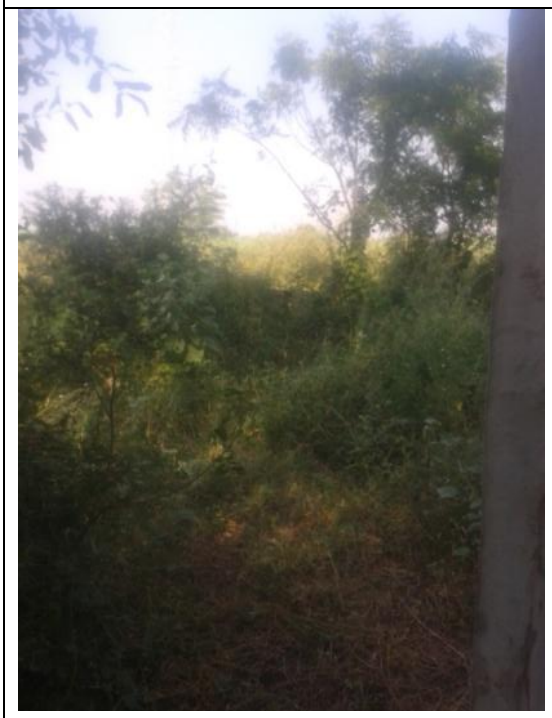
		
Photograph of Outlet No.LBMC-40		Photograph of Outlet No.LBMC-41
		
Photograph of Outlet LBMC042		Photograph of Outlet LBMC043

		
Photograph of Outlet LBMC044		Photograph of Outlet LBMC045
		
Photograph of Outlet LBMC046		Photograph of Outlet LBMC047

		
Photograph of Outlet LBMC048		Photograph of Outlet LB-D1005
		
Photograph of Outlet LB-D2002		Photograph of Outlet LB-D2005

		
Photograph of Outlet LB-D2008		Photograph of Outlet LB-D2010
		
Photograph of Outlet LB-D3002		Photograph of Outlet LB-D3009

		
Photograph of Outlet LB-D6003		Photograph of Outlet LB-D6006
		
Photograph of Outlet LB-D6007		Photograph of Outlet RBMC005

		
Photograph of Outlet RBMC009		Photograph of Outlet RBMC011
		
Photograph of Outlet RBMC014		

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:

Adequate Availability of Water:

Has any official of Irrigation/ Agriculture:

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 georeferencing 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.	Potential utilized during last five years are given in Annexure-I however storage position in the reservoir and utilization was not available . As such simulation study could not be carried out.

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.	There are no Minors in the project. The data at distributory level as provided by the project officials has been given in the report. The gap in IPC and IPU is 890 ha which is 73.3 %. This wide gap is due to farmers 's preference of assured alternative source of water due to availability of subsidised electricity at fixed rate. As such farmers do not demand water from the project inspite of availability of water.
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. Acual cropping pattern as provided by project officials on the basis of their records have been reported. It was reported by project officials that farmers generally grow less water consuming crops like cotton, groundnut and bajra in the area.
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.	Corrected in Table 5.1. Error regretted.
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
	FULZAR-I	
1	Storage position of the reservoir for the year in which maximum IPU was achieved should be given.	Maximum IPU was reported to have been achieved during the year 1997-98 but the details of storage position were not available.
2	In the column of location, what is the meaning of B.	Typographical error. corrected on page 53. The error regretted.
3	How volumetric measurement has been done for ungated outlets.	Discharge figures for ungated structures have been taken as provided by project officials. Generally, even project officials are also not maintaining any record of water discharge at outlet level

APPENDIX-II

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 नं0 411 (एस), सेवा भवन Room No. 411(S), Sewa Bhawan,
रामाकृष्णपुरम, नई दिल्ली - 110066 R.K. Puram, New Delhi-110066
फोन / फेक्स नं0. 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
14/3/17
(एस. के. राजन)
निदेशक (आ0 एवं प्र0)

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.