REPORT ON
PILOT CENSUS OF SUKLA 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	Distributary
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

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 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, distributary, 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 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 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

Sukla Project is located in Baksa District of Assam. Baksa was notified as one of the districts of Bodoland Territorial Council in October 2003 while it started functioning from 1 June 2004 when Dr Anwaruddin Choudhury of the Assam Civil Service took charge as its founder Deputy Commissioner. It started working from PWD Inspection Bungalow of Barama on the NH 31 till it was shifted to Mushalpur in late 2010. The district was created from parts of Barpeta, Nalbari, and Kamrup districts. Mushalpur town is the headquarters of the district. This district is bounded by Bhutan in the north, Udalguri district in the East, Barpeta, Nalbari and Kamrup Districts in the south and Chirang district in the west. The geographical area of the district is 2400 km². The district has three sub-divisions: Mushalpur, Salbari and Tamulpur. These sub-divisions are further divided into 13 revenue circles:

Baksa, Barama, Tamulpur, Goreswar, Baganpara, Ghograpar, Barnagar, Bajali, Ja lah, Patharighat, Rangia, Sarupeta and Tihu. Three Vidhan Sabha constituencies of this district are Tamulpur, Barama and Chapaguri. All of these are part of Kokrajhar Lok Sabha constituency.

According to the 2011 census Baksa district has a population of 953,773 roughly equal to the nation of Fiji or the US state of Montana. This gives it a ranking of 458th in India (out of a total of 640). The district has a population density of 475 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 11.17%. Baksa has a sex ratio of 967 females for every 1000 males, and a literacy rate of 70.53%. Baksa district is the home many tribal inhabitants like Bodo, Rabha, Sarania kachari and Madahi.

The location map of the Sukla Irrigation project is depicted in **Fig. 4.1**.

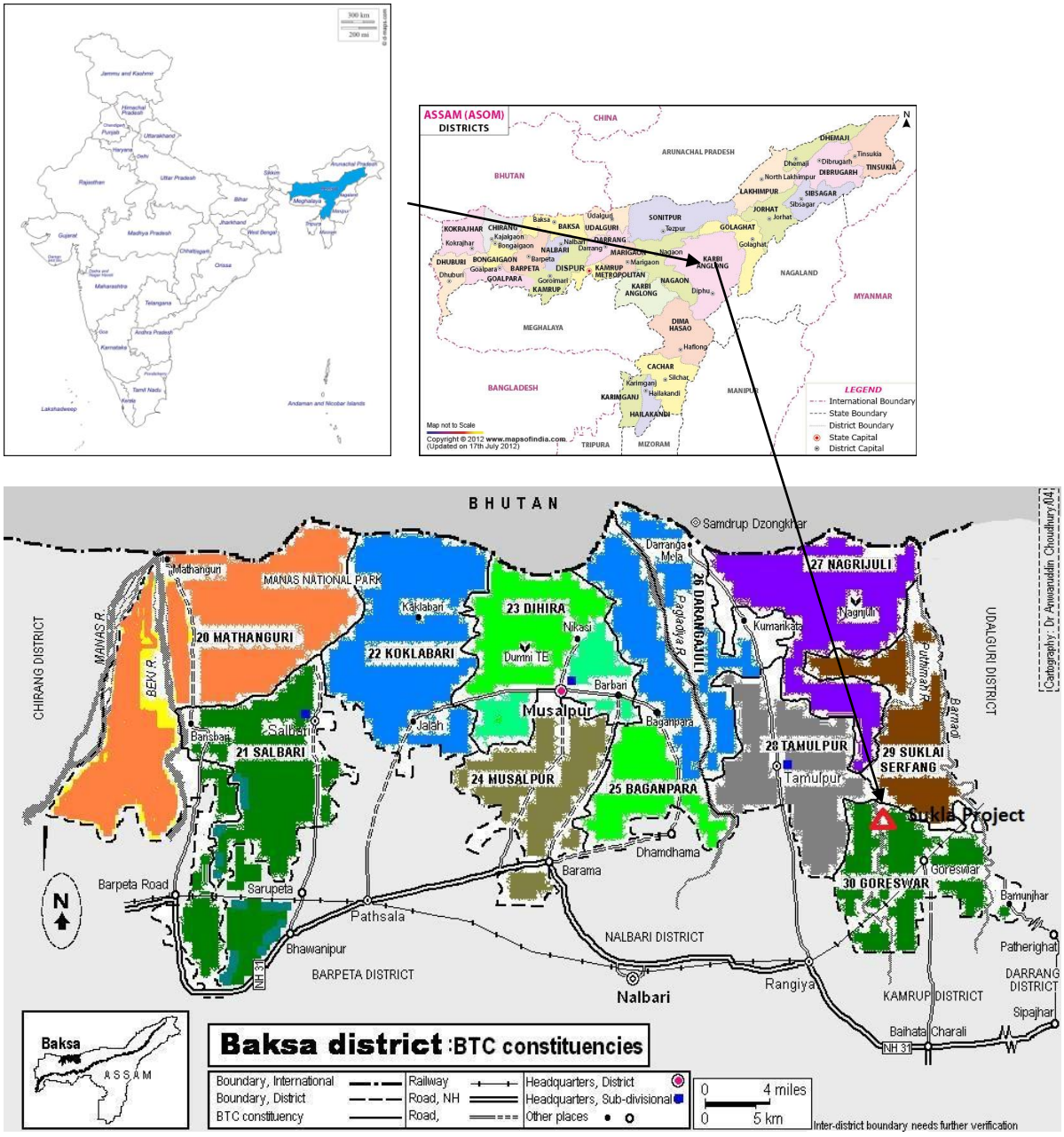

Fig. 4.1 Location Map of Sukla Irrigation Project

The river Sukla originates in the Bhutan hills and is joined by a number of perennial streams in the upstream of the head works located near village Naokata. The catchment of the river up to the Head works in 272sq. km. The project is bounded between longitude 91^{o} 41’ and 91^{o} 50’ E and latitude 26^{o} 21’ and 26^{o} 40’ N. The Head work has been constructed on a diversion channel near Naokata and is approachable by the PWD road. The Distance of the head work from Guwahati

is about 74 km. The nearest rail station is Goreswar of the North Eastern Railway. The command area is bounded by the river Barnadi on the East, by the Sukla - Puthimari River on the North and West and by the Belkona-Rangia PWD road on the South.

Sukla Irrigation Project was originally proposed in 1962 for an estimated amount of Rs. 67.00 Lac, and as such the Planning Commission accorded approval of the Scheme with a revised estimate of amounting to Rs. 490.00 Lac targeting an annual irrigation potential of 22,400 Hectare and accordingly the Sukla Irrigation Project (SIP) was erected and commissioned in 1978. The Sukla Irrigation Project achieved maximum irrigation potential of 15,635 Hectare during 1982-83. Thereafter, the created potential decreased gradually due to the damage in the irrigation system of the scheme, like damage of Falling Shutter System in the Spillway of Cross Regulator of Sukla Head works, damage of Cross drainage works and canal system. The scheme became completely defunct in 2000 and the created potential was totally lost.

The Scheme was under operation for 22 years and lacked proper maintenance for paucity of maintenance fund, unfavourable law and Order situation prevailed during the agitation period and also damage like wear and tear of the earthen canal system due to onslaught of recurring floods.

Salient Features of the Project

The Sukla barrage being a run-of- river project has been constructed on a diversion cut near village Naokata and is a composite RCC Structure of 9.45 m height and of 156 m length.

Location	:	Latitude: 26^{o}38'20" N Longitude: 91^{o}44'15" E
Nearest Village	:	Naokota
Crest Level	:	74.5 m
Pond Level	:	76.65m
Design Flood	:	1131.18 Cumec
Scouring sluices	:	2 No. : 6.18m (20ft) each

Scouring sluices pier	:	1 No.	:	1.52m (5ft)
The River sluices	:	2 No.	:	6.1m (20ft) each
The Fish passage	:	1 No.	:	2.13m (7 ft)
The Divide wall	:	2 No.	:	1.52m (5 ft) each
The Fish ladder	:	1 No.	:	1.52m (5 ft)
Spillway	:	80 No.:		121.95m (400ft)
[Falling shutters]				
Spillways pier	:	5 No.	:	1.52m (5ft)

The barrage planned to be fitted with electrically operated vertical lift gates has however, been fitted with 80 no. of 1.52 x 1.22m high drop shutters in the spillway. Two vertical lift steel shutters have been provided each in the scouring sluices and river sluices. The steel shutters are electrically operated and also have provision for manual operation.

A head regulator comprising 4 bays of 3.66m (12ft) each has been constructed on the left bank u/s of barrage to pass a design discharge of 14.15 cumecs (500 cusecs) in the two canals. The head regulator is provided with 4 nos. of 3.66 x 1.67m (12 x 5.5ft) vertical lift gates for regulating releases into the canals.

Initially two canal Distributaries D1 and D2 directly take off from the head regulator. A small divide wall constructed in continuation of second pier from the right that separates the two distributaries. Distributary D1 irrigates areas in the west of Baihata Chariali - Naokata - Goreswar PWD Road while the other Distributary D2 provides irrigation water to the command area on the east of PWD road.

The Distributary D1 takes off from the right side of Regulator and flows on a ridge parallel to the river Sukla and Puthimari and has a total length of 28.80 km. Moreover, there are 5 no. of minors on the left bank and 7 no. on the right bank of D1 to irrigate an area of 4944 ha. The collective length of the 12 minors is 37.5 km. Besides there are 75 direct outlets from D1, 28 no. on

the left bank and 47 no. on the right bank and provide irrigation to an area of 2356 ha.

The Distributary D2 which takes off from the left side of Regulator flows on another ridge between Barnadi and Naokata – Guwahati PWD Road for a distance of 31.70 km. It has only one minor on the right bank and 4 minors on the left bank. The collective length of the 5 minors and their sub-minors is 48.0 km. The Command area under the 5 minors of distributary D2 is 5324 ha. As in distributary D1 there are 82 direct outlets in D2 for providing irrigation to an area of 3030 ha. 43 no. of outlets take off from the left bank of the canal while 39 no. of outlets take off from the right side. For all practical purpose, distributaries D1 and D2 are the main canals. Command area of sub-minors is 1512 ha.

The canal system is unlined. The following structures have been provided in the canal system.

1. Aqueducts	:	2 Nos. on Distributory D_1 3 Nos. on Distributory D_2
2. Falls	:	51 No.
3. Regulators	:	24 No.
4. R.C.C. Bridge	:	14 No.
5. Cross-drainage structures	:	28 No.
6. Escapes	:	2 No.
7. Pipe outlets/Direct outlets	:	157 No.
8. Tail Clusters	:	23 No.
9. Inlet/Outlets for drainage	:	106 No.

Directory of Canals as per records: Distributary and Minor wise details

Name	Designation	Length (Metre)	At Chainage (Metre)	Command Area in Ha
Main Canal	D1	28800.00		2356.00
Branch Canal	M1DI	5974.00	4024.00	4944.00
	M2Dl	2530.00	8107.68 of DI	
	M3D1	498000	9418.32 of DI	
	M4Dl	121900	10271.76 of DI	
	M5DI	2225.00	10911.84 of Dl	
	M6Dl	6839.71	14295.12 of DI	
	M7Dl	1584.96	14295.12 of DI	
	M8DI	3780.00	19720.56 of DI	
	M9Dl	231600	20878.80 of DI	
	M10DI	2621 00	22920.96 of DI	
	M11Dl	914.00	23032.20 of DI	
	MI2DI	152400	24932.64 of DI	
Main Canal	D2	31700.00		3030.00
Branch Canal	M1D2	5090.00	7943.00 of D2	
	M2D2	13716.00	2954.00 of D2	5324.00
	M3D2	3658.00	9933.92 of D2	
	M4D2	3870.96	6365.20 of D2	
	M5D2	1402.00	7096.72 of D2	
Distributory	S1M2D2	179800	92 94 of M2D2	380.00
	SIM3D2	1610.00	01.17 of M3D2	1132.00
	S2M3D2	1829.00	88.72 of M3D2	
	S3M3D2	1524.00	42.16 of M3D2	
	Total			17166.00

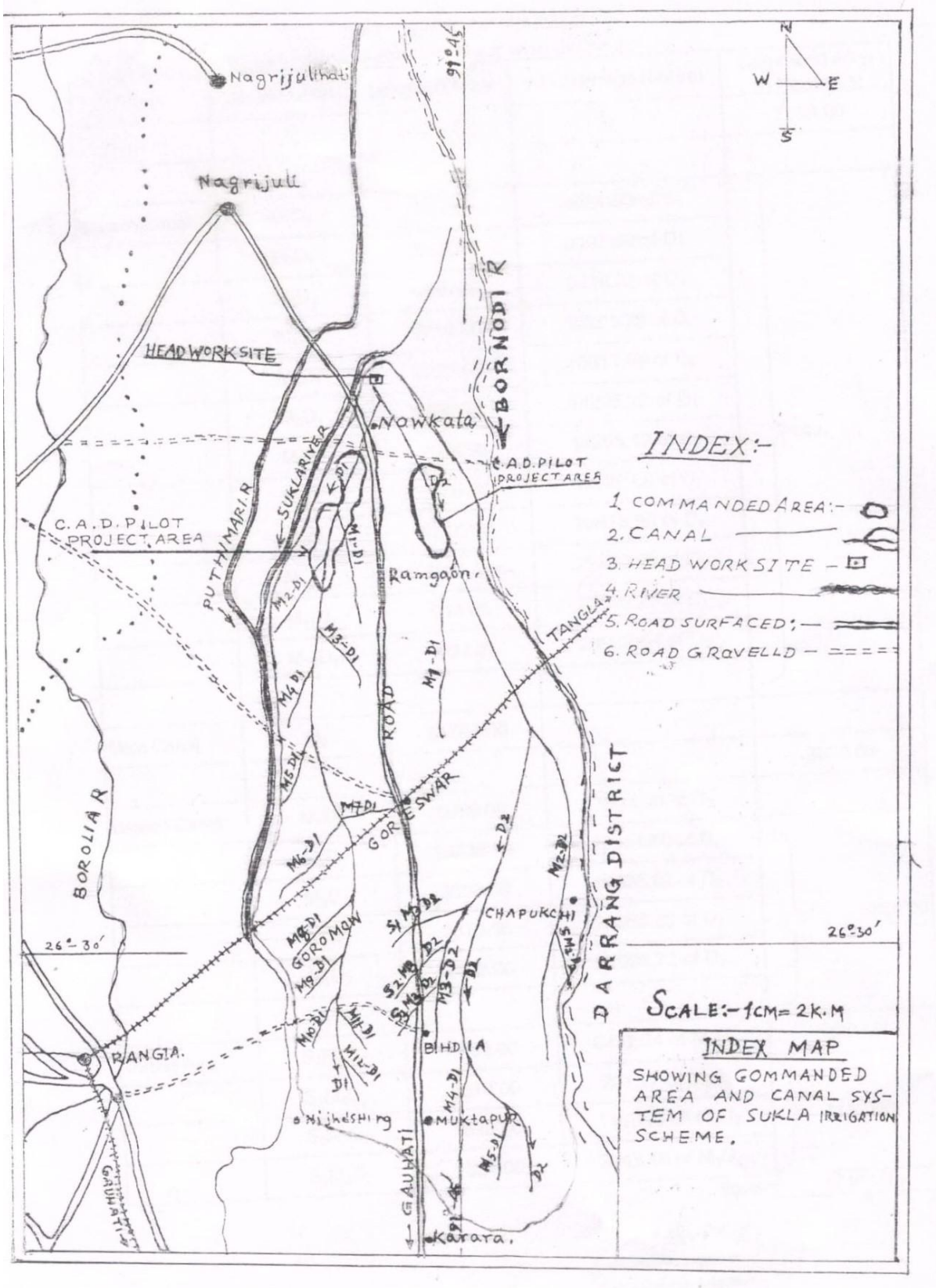
Nagrijulihati
Nagrijuli
HEAD WORK SITE
Nowkata
BORNODI R
C.A.D. PILOT PROJECT AREA
SUKLA RIVER
PUTHIMARI R
Ramgaon
TANGLA
ROAD
GORESWAR
BOROLIA R
CHAPUKORI
DARRANG DISTRICT
26°-30'
BIHDIA
RANGIA.
Nijheshing
MUKtapur
GAUHATI
Karata.
INDEX:-
1. COMMANDED AREA:-
2. CANAL
3. HEAD WORK SITE
4. RIVER
5. ROAD SURFACED:-
6. ROAD GRAVELLD
SCALE:- 1CM= 2K.M
INDEX MAP
SHOWING GOMMANDED AREA AND CANAL SYSTEM OF SUKLA IRRIGATION SCHEME.

Fig. 4.2 Index Map of Sukla Irrigation Project provided by Project Office

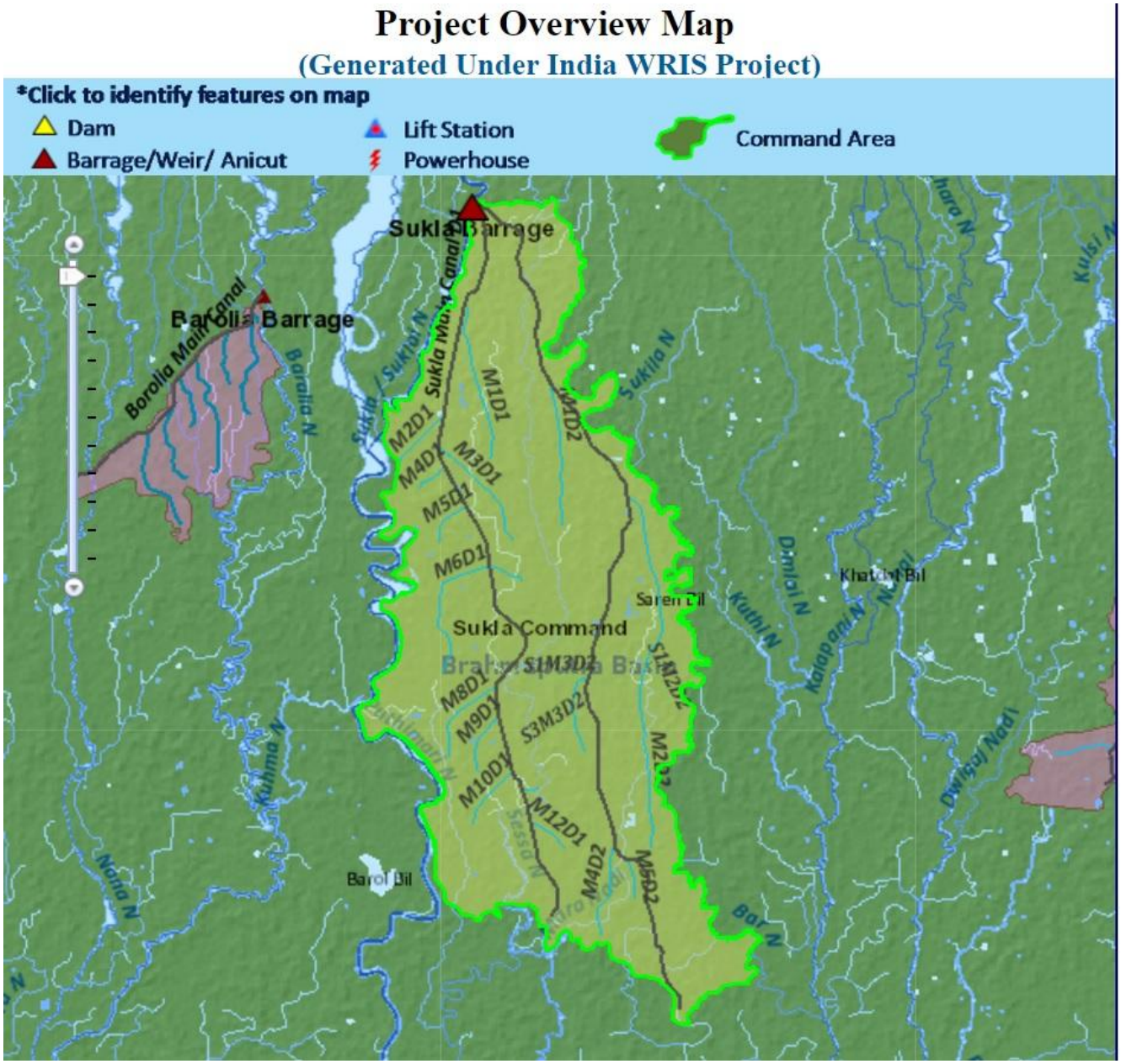

Fig. 4.3 Command Area Map of Sukla Irrigation Project

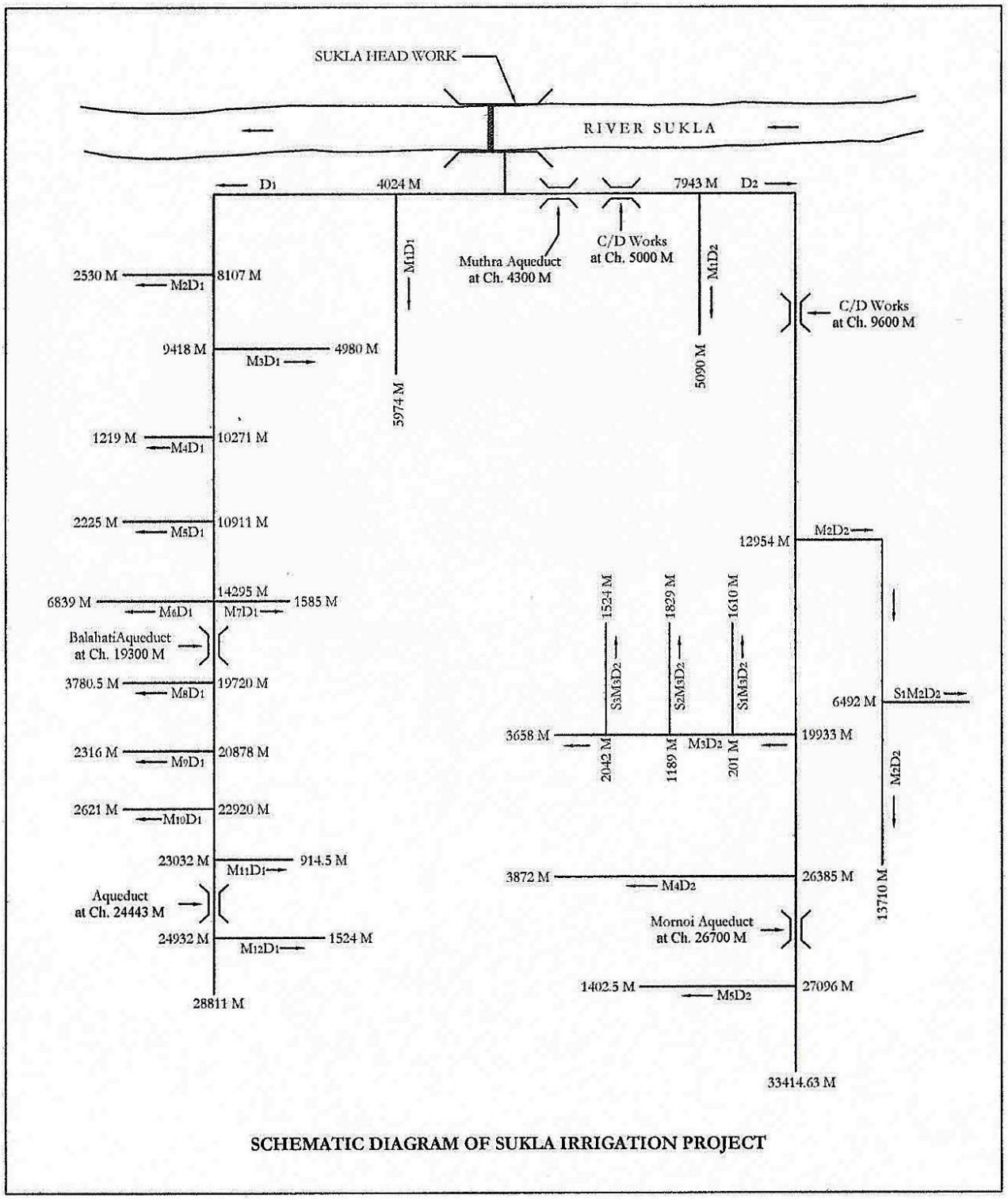

Figure 4.4 Schematic Diagram of Sukla Irrigation Project

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. Additionally, the data was proposed to be collected for Head, middle and tail reach of the canal network

vi. Index and Canal Network Map was 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**.** 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 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 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 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 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. R.K. Chaubey, Mr. Deepak Kumar etc. The core team interacted with Mr. Sanjeev Kumar IAS, Principal Secretary, Mr. Dholey, Secretary and others senior officers of Irrigation Department.
- The core team also visited the office of Superintending Engineer (Baksa) and met Mr. Pathak at Baska and Executive Engineer Mr. Gajanan Talukdar at Goreshwar.
- 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 Sukla, Assam. 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 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.
- Data was also collected from Office of the Subdivision Engineer, Baksa, Assam.
- 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 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 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, 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 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. The canal network along with command area and the outlets have been shown in **Fig. 6.1 to 6.9.**

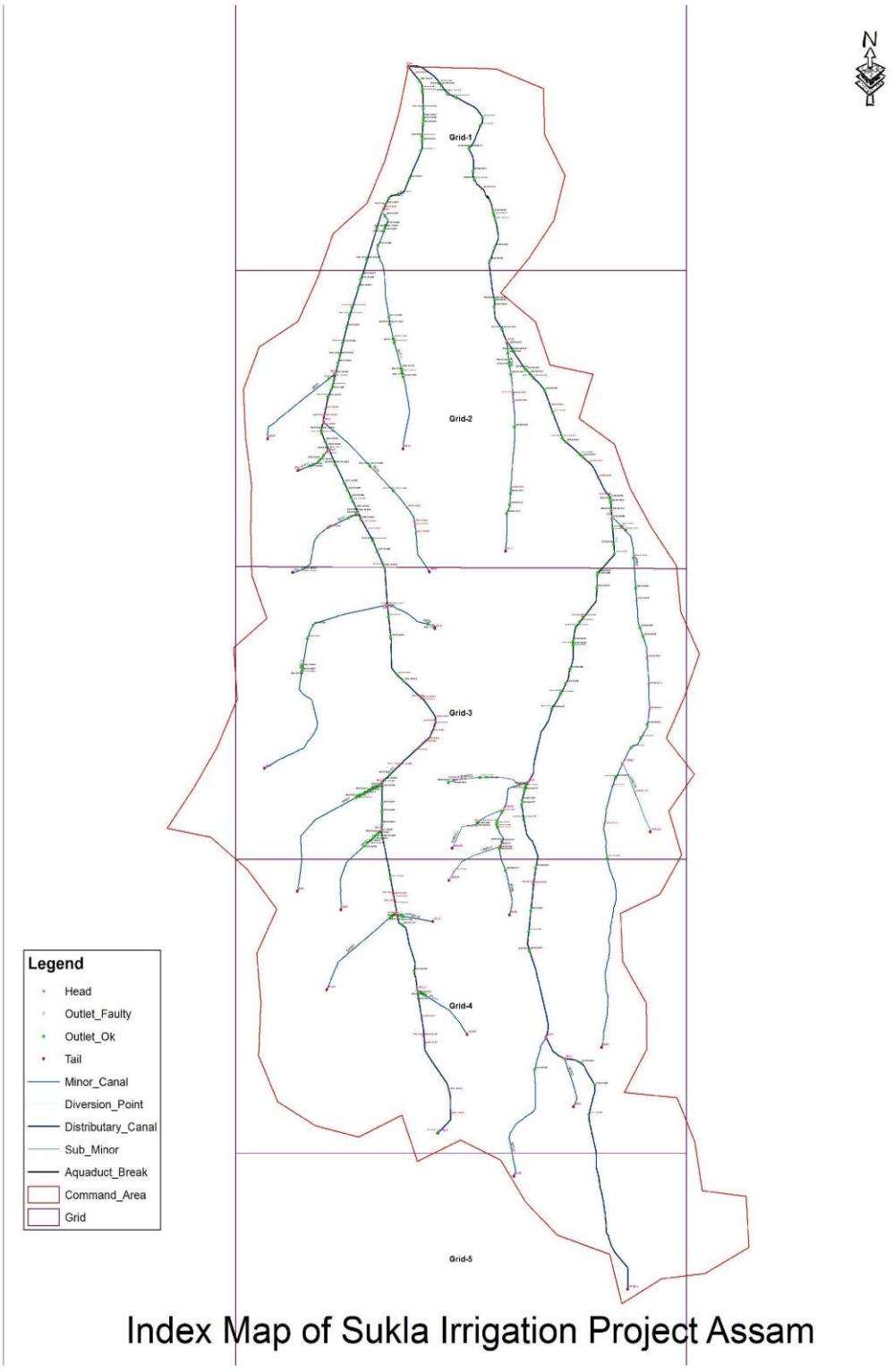

Fig. 6.1 Command Area of Sukla Irrigation Project

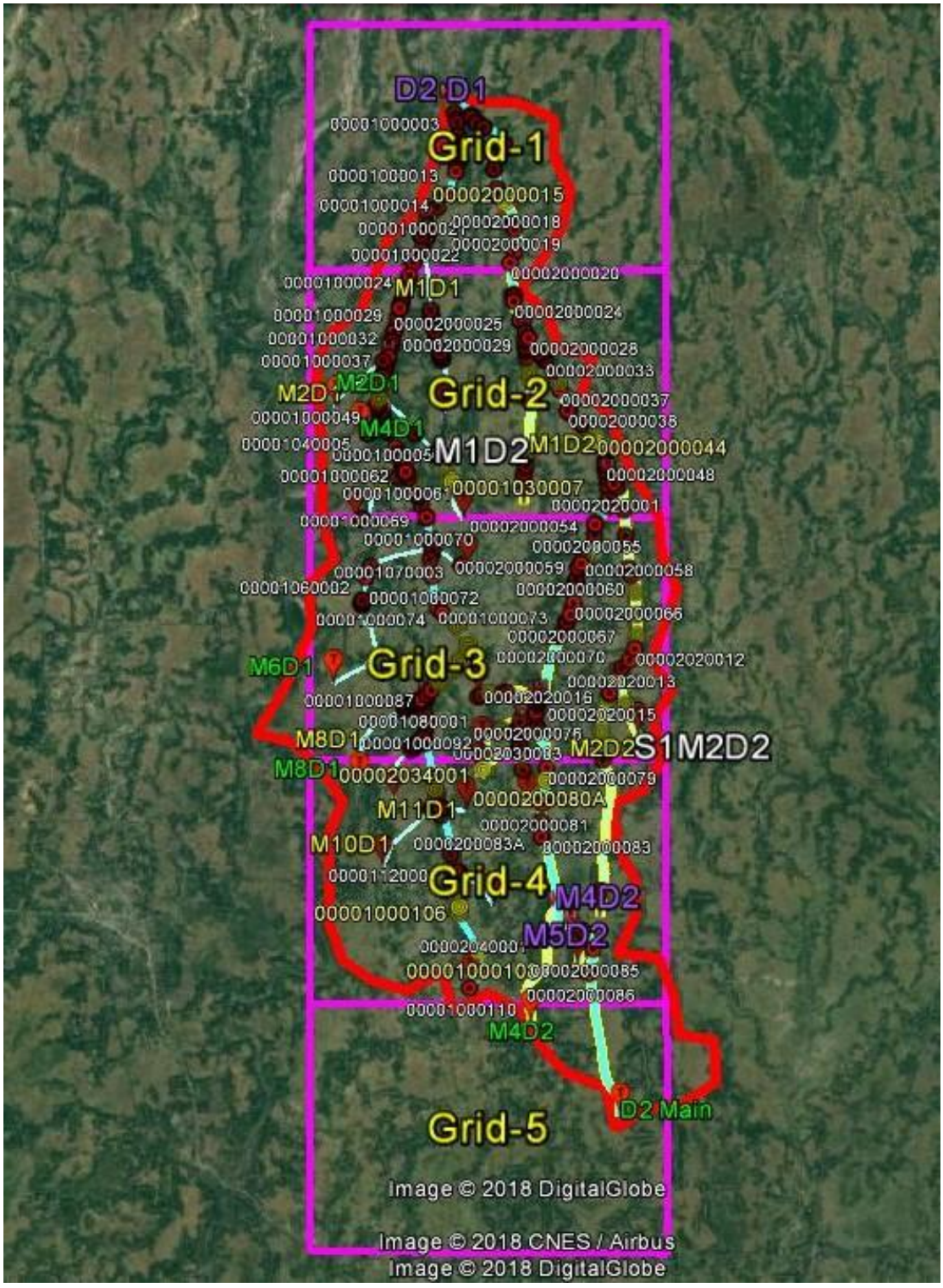

Fig. 6.2 Command Area Map of Sukla Irrigation Project with canal network and Outlets

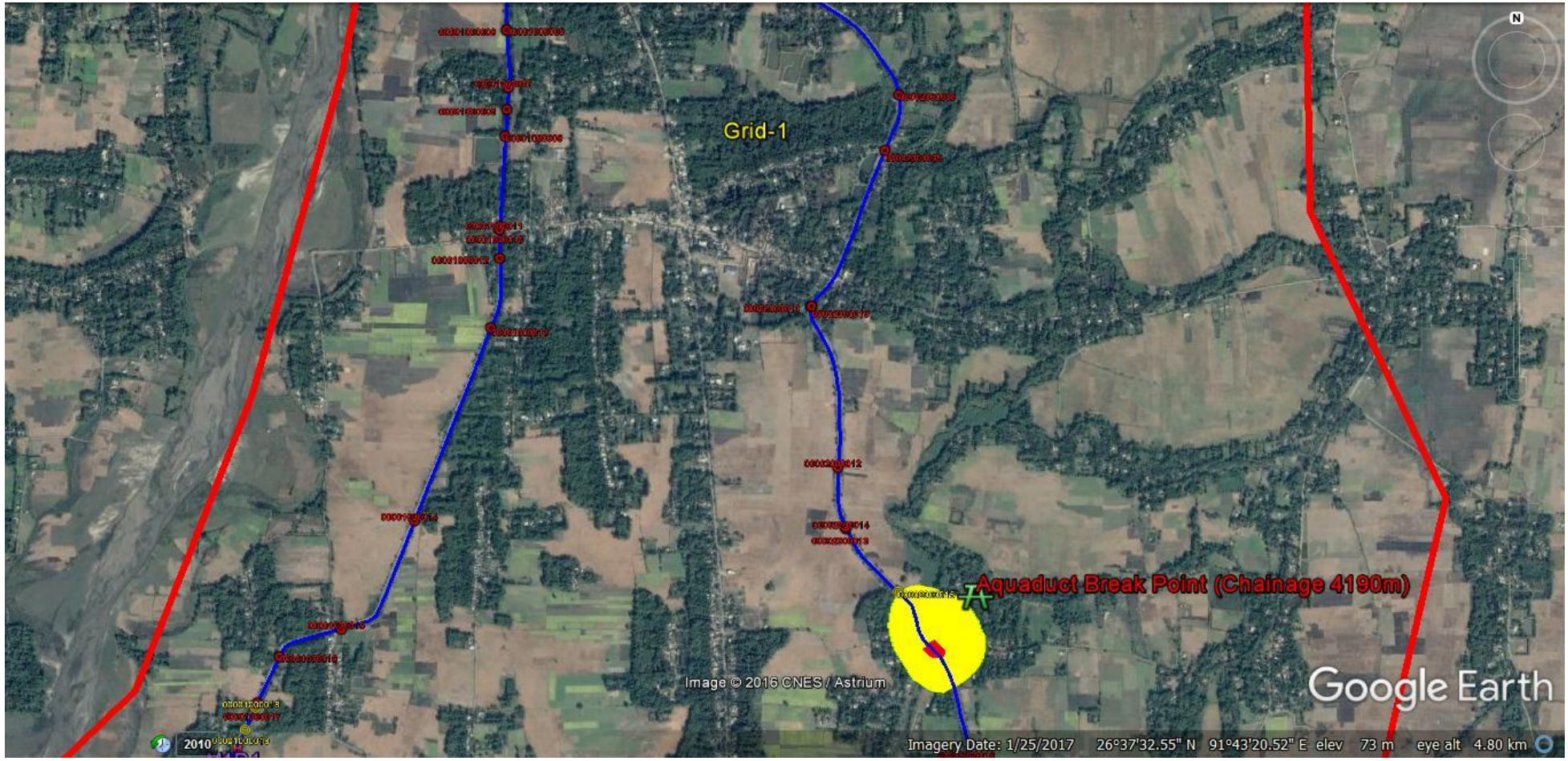

Fig. 6.3 Map showing the location of broken Aqueduct at Chainage 4300 on D2 Canal in Sukla Irrigation Project

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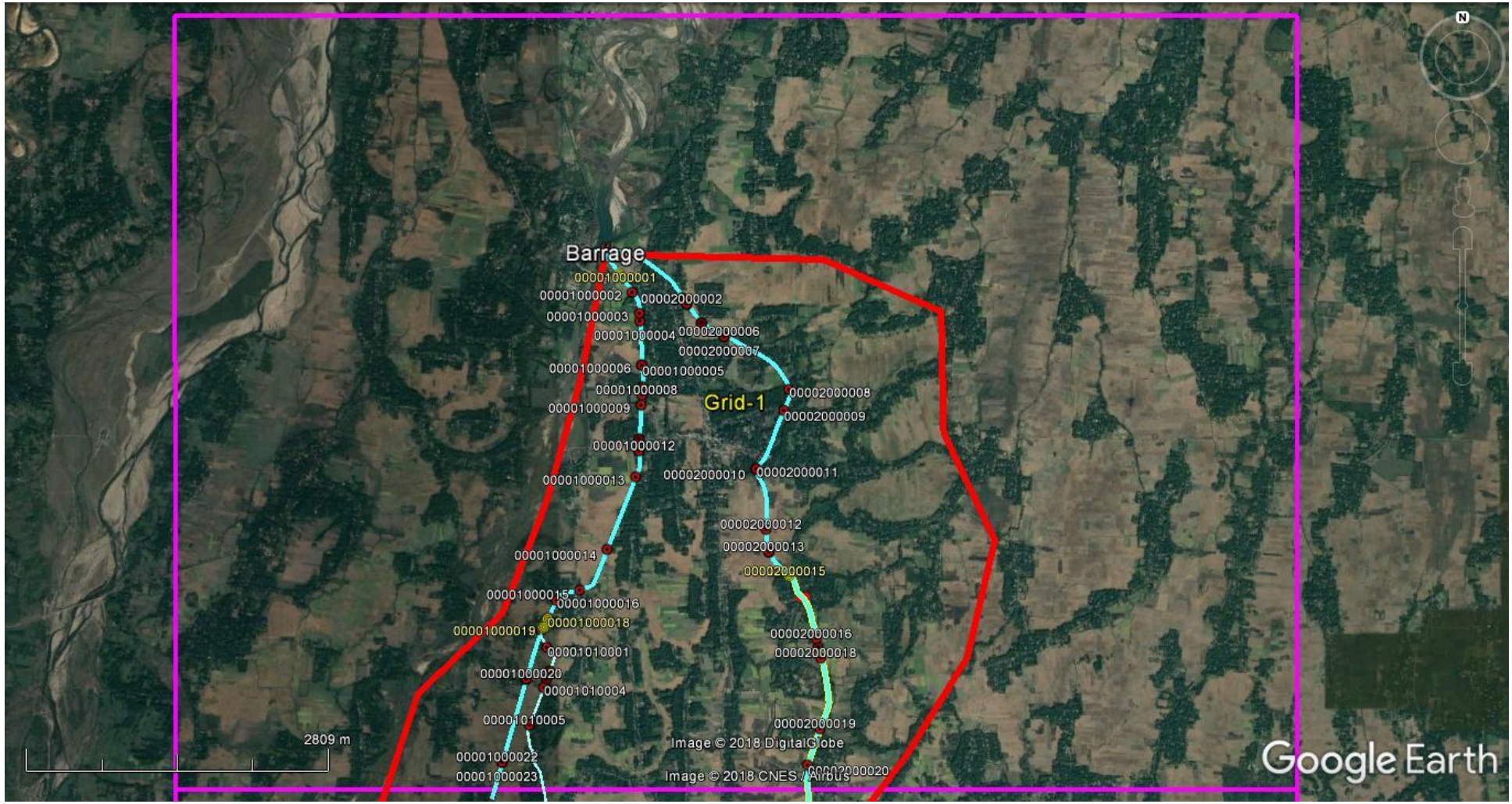


Fig. 6.4 Canal network and Outlets of Sukla Irrigation Project Grid-1

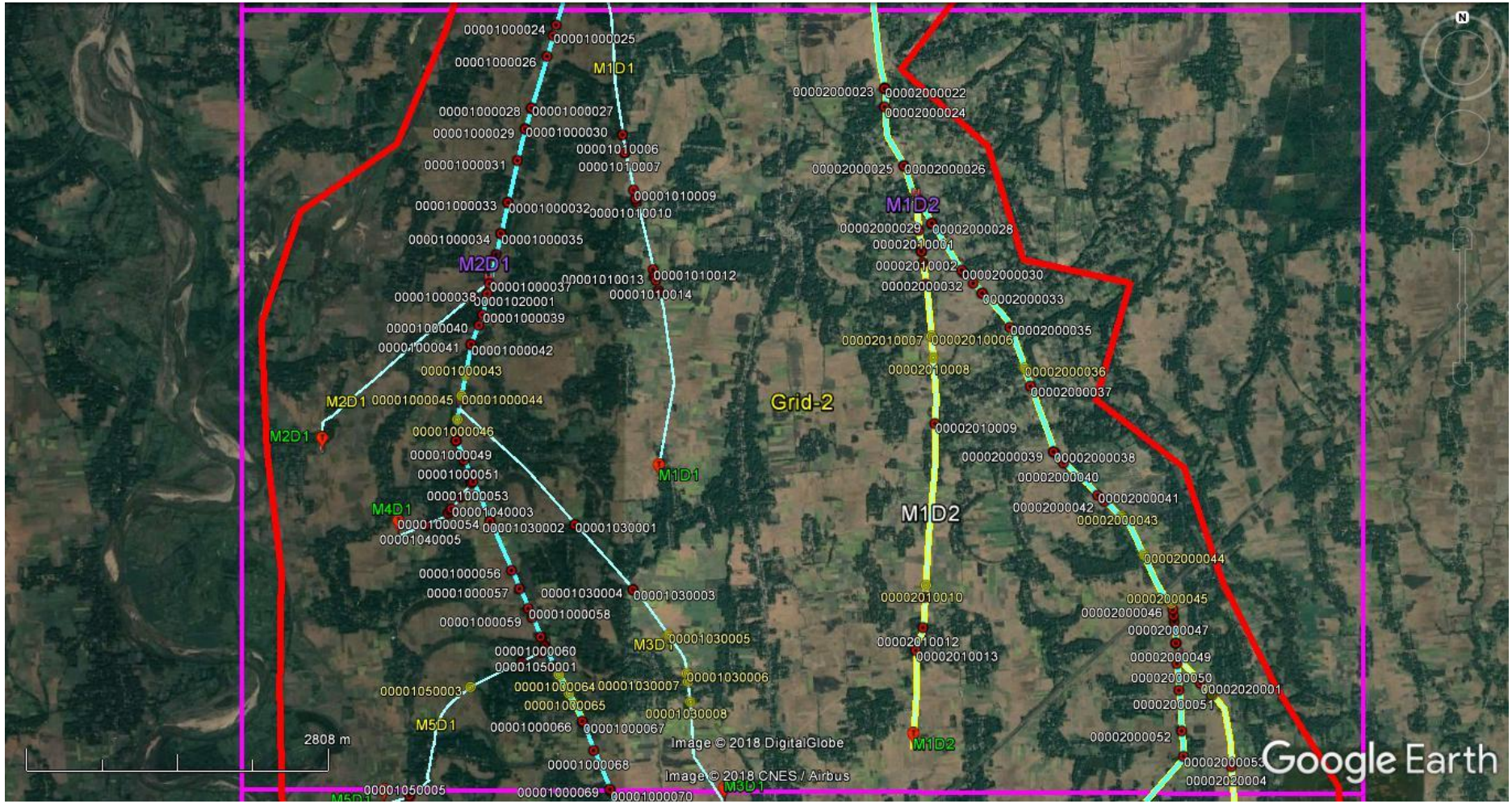


Fig. 6.5 Canal network and Outlets Grid-2

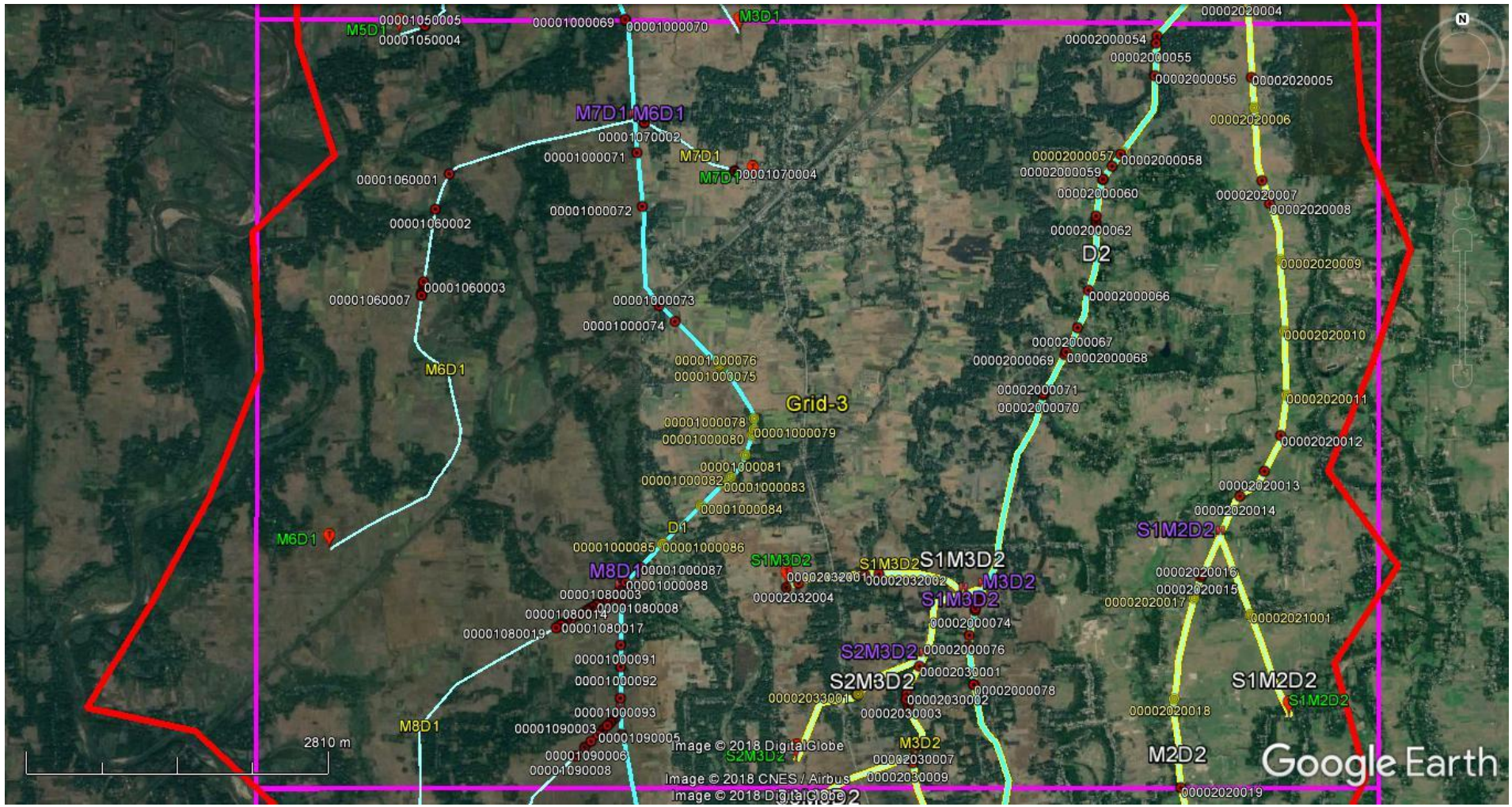


Fig. 6.6 Canal network and Outlets Grid-3

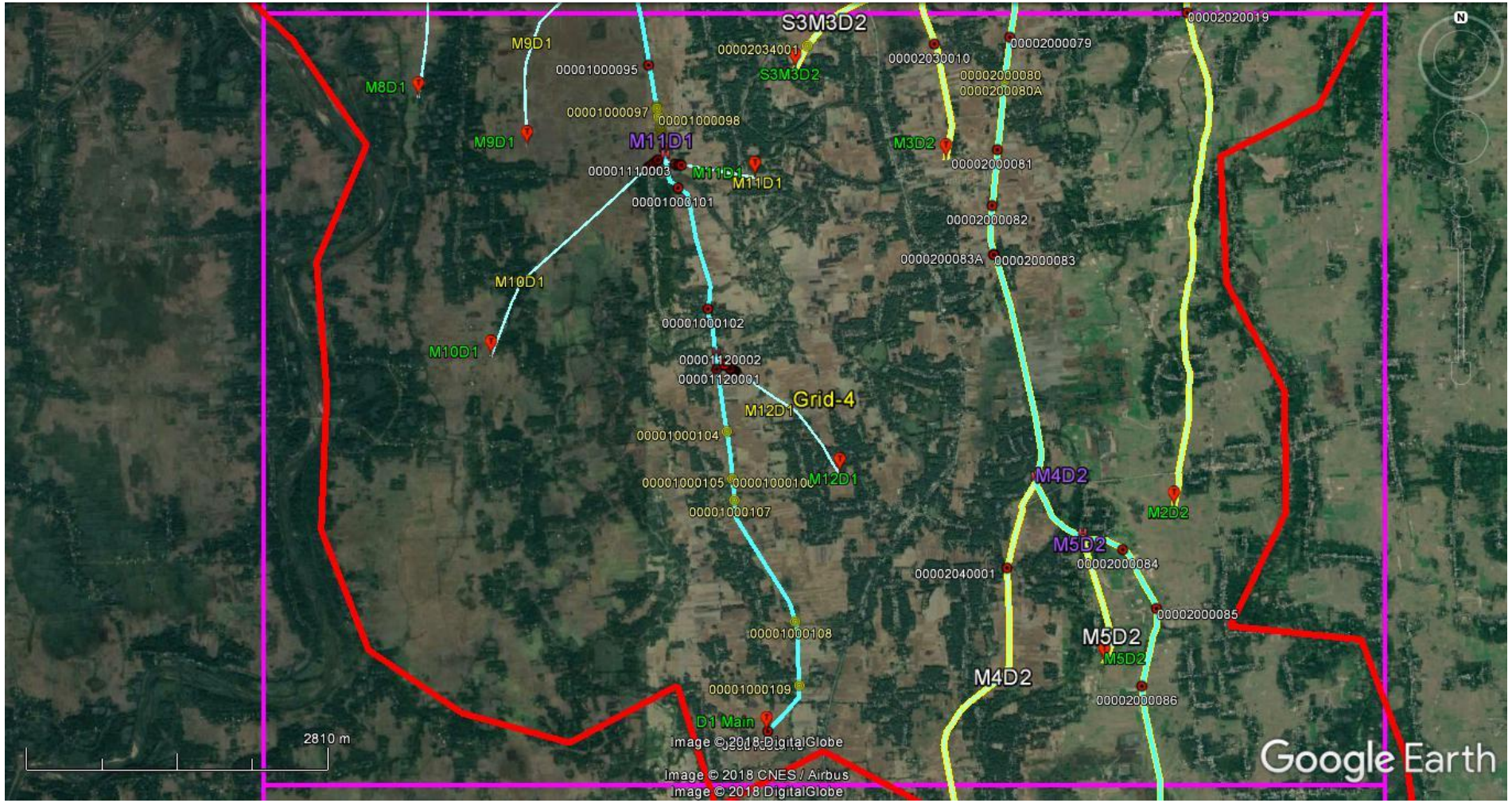


Fig. 6.7 Canal network and Outlets Grid-4

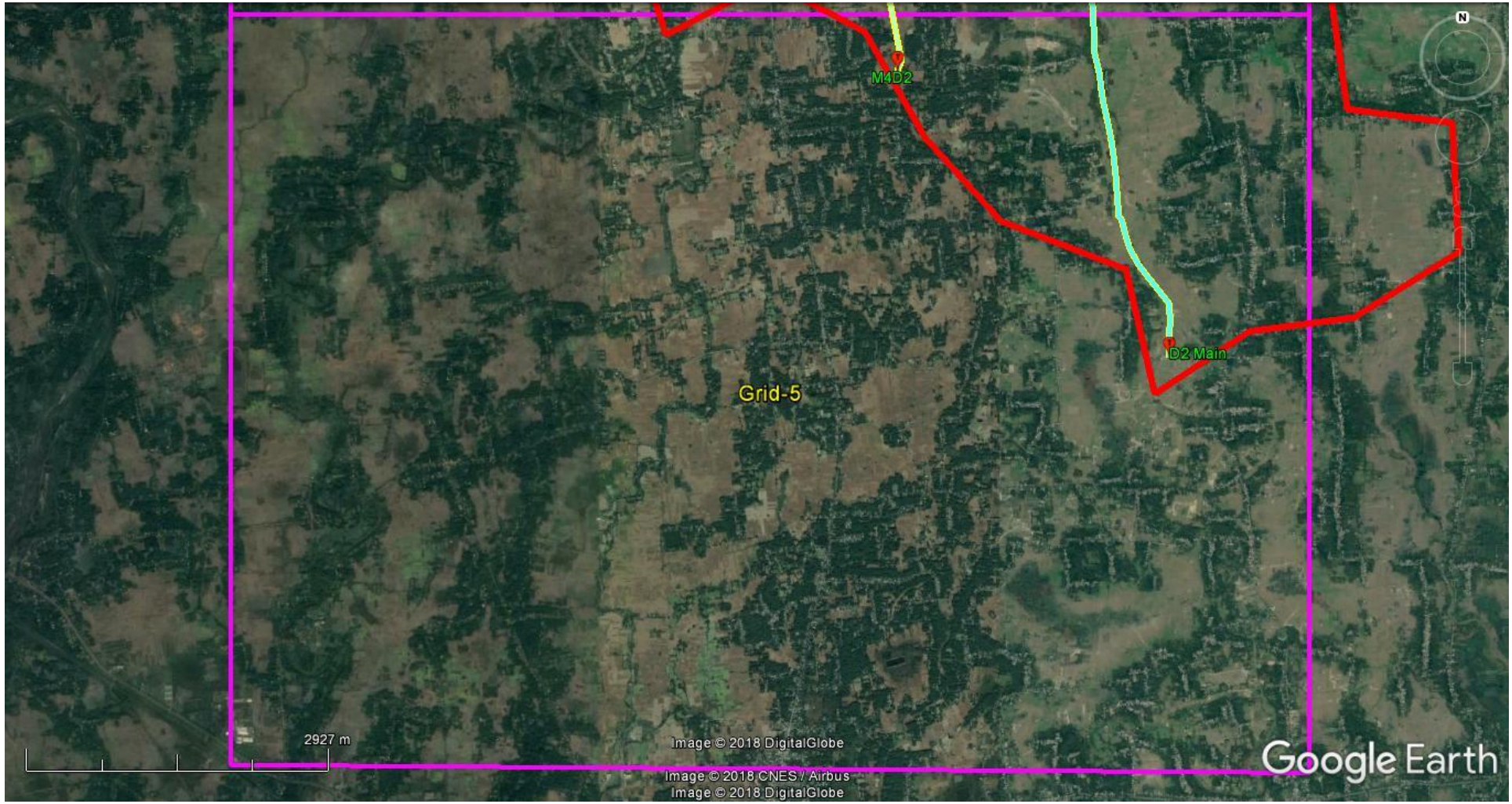


Fig. 6.8 Canal network and Outlets Grid-5

7. Results and Findings

- There are two Distributaries viz., D1 and D2 in the project. Both the distributaries are lined in initial reaches; viz. D1 between 0.00 to 400.0 m and D2 is lined between 0.0 to 350m. Thereafter, both the Distributaries and their minors are unlined.
- The data on IPU has been collected from the project officials on the basis of their record. 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.
- In absence of DPR, designed cropping pattern was not available. However actual cropping pattern as ascertained from the project has been reported.
- The naming of the canals, distributaries, minors and outlets have been made by project officials as per their own norms.
- Head reaches farmers grow cash crop, abundant water crops and refuse to go for water efficient or low water consuming crops.
- The situation gets aggravated due to non-availability of measuring devices/ practice of not measuring and keeping track of actual water flow through structures.
- Canal maintenance is not there so weeds grow and breakage occurs leading to obstruction in water reaching tail end.
- Water reaches up to tail end when it is not required by farmers at higher reaches.
- There is no incentive to save precious water.
- Theft of water and revenue on mass scale.
- During the survey, it has been noticed that the earthen canal/ distributaries/ minors are in general not properly maintained.

- The survey carried out by AFC India Limited worked out and observed that the status of canal network is in bad shape being not maintained properly for a long time.
- A lot of weeds even up to 3 to 4 ft high have been observed through-out the canal network. The weeds are obstructing water flow.
- Siltation of Canal network has been found at various locations which need to be rectified and canal system restored for proper flow of water in the system.
- Total IPC of Sukla Irrigation Project was 11500 ha in 2013-14
- The Gap between IPC and IPU has been found to be 2270 ha in the year 2014-15 which is about 19.74 % of IPC.
- Cropping pattern in the command area of Sukla irrigation project is given in the following Table:

Table 7.1 Cropping Pattern in Command Area 2014-15

Season	Name of the Crop	Cropped Area in ha
Kharif	Paddy (Sali) traditional/ HYV, Sugercane, vegetables	7360
Rabi	Mustard, pulses, potato, vegetables	1050
Summer	Ahu, vegetables	820
Total		**9230**

- It has been found that an **aqueduct at chainage 4290 m on D2 had broken in 2014 and the water is flowing into Muthra Drain.** The network beyond the chainage 4290 on D2 has become dysfunctional.
- The breakage of Aqueduct has affected and stopped the water supply to about 2000 ha area to which the system was serving with irrigation when it was functional. This is the main cause of gap between IPC and IPU in this project.

- Discussions with farmers at head, mid and tail reaches on D2 below approx. 4300m chainage revealed that they were doing farming on the basis of rain-fed irrigation.
- 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.
- Shortage of manpower and resources was also reported to be a major reason for gap in maintenance of canal system.
- The encroachment was observed on canals by erection of squatters along the canal line.
- At few places particularly near outlet No. M2D2-003 and M2D2-18 cultivation was observed inside the course of canal network.
- At many places the outlets on minors have been closed by the villagers.
- During survey, it was also revealed by farmers that there are frequent floods in the river leading to excess flow of water in the system. The excess flow of water with high velocity damages the canal system by making cuts. It also leads to retrogression of the downstream bed causing deep scour pits and bank erosion.
- General neglect and no annual budget for operation and maintenance (O& M) so the system deteriorates.
- It was also observed that there are 346 outlets in the project. However, Aqueduct is broken at chainage of 4300 m approx. below which there are 129 outlets. Thus presently only 217 outlets are functional (202 on D1 and 15 on D2). Out of these 217 functional outlets 38 outlets are found to be broken/ damaged which accounts for about 17.51% of functional outlets. In total out of 346 outlets 61 outlets are broken/ damaged and silted which accounts for about 17.63%.
- Details of affected outlets have been given in **Table 7.2.**

Table 7.2 Details of Affected Outlets and Network

	Distributary	Minor	Sub - Minor	Chainage m	Outlet Sl. No.	Location (L/R)	Size of Outlet (cm)	Outlet ID *	District	Block / Tehsil	Village	Remarks
1	D1	NA	NA	400	001	RB	45.72	00001000001	Baksa	Goreswar	No.1 Jalthangpar	Weeds and Siltaion
2	D1	NA	NA	3900	018	RB	15.24	00001000018	Baksa	Goreswar	Nathkuchi	Weeds & Siltation
3	D1	NA	NA	4000	019	RB	30.48	00001000019	Baksa	Goreswar	Nathkuchi	Weeds & Siltation
4	D1	NA	NA	9200	043	RB	15.24	00001000043	Baksa	Goreswar	Pukhuripar	Weeds
5	D1	NA	NA	9400	044	LB	15.24	00001000044	Baksa	Goreswar	Ouguri	Weeds
6	D1	NA	NA	9400	045	RB	15.24	00001000045	Baksa	Goreswar	Ouguri	Weeds
7	D1	NA	NA	9600	046	LB	15.24	00001000046	Baksa	Goreswar	Ouguri	Weeds
8	D1	NA	NA	12190	064	LB	15.24	00001000064	Baksa	Goreswar	Ouguri	Broken
9	D1	NA	NA	12400	065	RB	30.48	00001000065	Baksa	Goreswar	Ouguri	Broken
10	D1	NA	NA	16900	075	LB	45.72	00001000075	Baksa	Goreswar	No. 3 Goreswar	Weeds
11	D1	NA	NA	16900	076	RB	30.48	00001000076	Baksa	Goreswar	No. 3 Goreswar	Weeds
12	D1	NA	NA	16930	077	RB	30.48	00001000077	Baksa	Goreswar	No. 3 Goreswar	Weeds
13	D1	NA	NA	17500	078	RB	60.96	00001000078	Baksa	Goreswar	Gerua	Weeds
14	D1	NA	NA	17600	079	LB	30.48	00001000079	Baksa	Goreswar	Gerua	Weeds
15	D1	NA	NA	17660	080	RB	30.48	00001000080	Baksa	Goreswar	Gerua	Weeds
16	D1	NA	NA	17850	081	LB	60.96	00001000081	Baksa	Goreswar	Gerua	Siltation & Weeds
17	D1	NA	NA	18100	082	LB	30.48	00001000082	Baksa	Goreswar	Gerua	Weeds
18	D1	NA	NA	18200	083	RB	76.2	00001000083	Baksa	Goreswar	Balahati	Weeds
19	D1	NA	NA	18500	084	LB	30.48	00001000084	Baksa	Goreswar	Balahati	Weeds
20	D1	NA	NA	19000	085	RB	30.48	00001000085	Baksa	Goreswar	Balahati	Weeds
21	D1	NA	NA	19000	086	LB	30.48	00001000086	Baksa	Goreswar	Balahati	Weeds
22	D1	NA	NA	22500	096	RB	45.72	00001000096	Baksa	Goreswar	Joykuchi	Siltation & Weeds
23	D1	NA	NA	22520	097	RB	30.48	00001000097	Baksa	Goreswar	Joykuchi	Weeds
24	D1	NA	NA	22600	098	RB	45.72	00001000098	Baksa	Goreswar	Joykuchi	Weeds

25	D1	NA	NA	22700	099	RB	30.48	00001000099	Baksa	Goreswar	Joykuchi	Weeds
26	D1	NA	NA	22750	100	LS	30.48	00001000100	Baksa	Goreswar	Joykuchi	Weeds
27	D1	NA	NA	25550	104	RB	60.96	00001000104	Baksa	Goreswar	Jatiya Bhangra	Weeds
28	D1	NA	NA	26000	105	RB	76.2	00001000105	Baksa	Goreswar	Jatiya Bhangra	Weeds
29	D1	NA	NA	26000	106	LB	76.2	00001000106	Baksa	Goreswar	Jatiya Bhangra	Weeds
30	D1	NA	NA	26200	107	RB	30.48	00001000107	Baksa	Goreswar	Jatiya Bhangra	Weeds
31	D1	NA	NA	27500	108	RB	30.48	00001000108	Baksa	Goreswar	Jatiya Bhangra	Weeds
32	D1	NA	NA	28100	109	LB	30.48	00001000109	Baksa	Goreswar	Mukundapur	Weeds
33	D1	M3D1	NA	2850	005	RB	60.96	00001030005	Baksa	Goreswar	Bhogpur	Weeds
34	D1	M3D1	NA	3250	006	LB	91.44	00001030006	Baksa	Goreswar	Ramcha	Weeds
35	D1	M3D1	NA	3330	007	RB	60.96	00001030007	Baksa	Goreswar	Ramcha	Weeds
36	D1	M3D1	NA	3520	008	LB	30.48	00001030008	Baksa	Goreswar	Ramcha	Weeds
37	D1	M5D1	NA	800	003	LB	30.48	00001050003	Baksa	Goreswar	Borkaswala	Siltation
38	D2	NA	NA	4100	015	RB	30.48	00002000015	Baksa	Goreswar	Pub Naokata	Aqueduct Broken
	Aqueduct Broken at Chainage 4300 is in Main Distributary D2.Water is not flowing in the canal after this point											
39	D2	NA	NA	9900	036	RB	30.48	00002000036	Baksa	Goreswar	Ramchajhar	Broken
40	D2	NA	NA	11600	043	RB	15.24	00002000043	Baksa	Goreswar	Bakulguri	Siltation
41	D2	NA	NA	12000	044	LB	45.72	00002000044	Baksa	Goreswar	Kerpavita	Siltation
42	D2	NA	NA	12550	045	RB	30.48	00002000045	Baksa	Goreswar	Kerpavita	Siltation
43	D2	NA	NA	15768	057	RB	30.48	00002000057	Baksa	Goreswar	Ranjitapar	Broken
44	D2	NA	NA	22623	080	RB	45.72	00002000080	Baksa	Goreswar	Bardangerikuchi	Siltation

45	D2	NA	NA	22623	80A	LB	45.72	0000200080A	Baksa	Goreswar	Bardangeri kuchi	Siltation
46	D2	M1D2	NA	1300	006	RB	30.48	00002010006	Baksa	Goreswar	Rowmari-No. 1	Weeds
47	D2	M1D2	NA	1300	007	LB	30.48	00002010007	Baksa	Goreswar	Kechajhar	Weeds
48	D2	M1D2	NA	1500	008	RB	30.48	00002010008	Baksa	Goreswar	Kechajhar	Weeds
49	D2	M1D2	NA	3600	010	LB	91.44	00002010010	Baksa	Goreswar	Ramchajhar	weeds
50	D2	M2D2	NA	460	003	RB	76.2	00002020003	Baksa	Goreswar	Rampur	Farmers Cultivating in Canal
51	D2	M2D2	NA	2200	006	LB	45.72	00002020006	Baksa	Goreswar	Rampur	Broken
52	D2	M2D2	NA	3650	009	RB	45.72	00002020009	Baksa	Goreswar	Hajalpara	Siltation
53	D2	M2D2	NA	4300	010	LB	45.72	00002020010	Baksa	Goreswar	Hajalpara	Siltation
54	D2	M2D2	NA	4900	011	LB	30.48	00002020011	Baksa	Goreswar	Gopchar	Siltation
55	D2	M2D2	NA	7010	017	LB	30.48	00002020017	Baksa	Goreswar	Badangeri Kuchi	Broken
56	D2	M2D2	NA	7970	018	RB	91.44	00002020018	Baksa	Goreswar	Badangeri Kuchi	Farmers Cultivating in Canal
57	D2	M2D2	S1M2D2	770	001	LB	30.48	00002021001	Baksa	Goreswar	Gopchar	Siltation
58	D2	M3D2	NA	1470	005	LB	15.24	00002030005	Baksa	Goreswar	Lokra Barnagar	Siltation
59	D2	M3D2	S1M3D2	1400	003	RB	30.48	00002032003	Baksa	Goreswar	Garogaon	Broken
60	D2	M3D2	S2M3D2	700	001	LB	76.2	00002033001	Baksa	Goreswar	Bardangeri Kuchi	Siltation
61	D2	M3D2	S3M3D2	1260	001	LB	30.48	00002034001	Baksa	Goreswar	Bardangeri Kuchi	Siltation

8. Constraints/ Reasons for Gap between IPC and IPU

- Breakage of Aqueduct at chainage 4290 of D2 is the major reason of Gap in this project.
- 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 Headwork, Control/ measuring devices, broken outlets etc.
- Earthen water distribution channels.
- Frequent breaches.
- Irregular de-silting of distribution channels.
- Operation & Maintenance budget being inadequate.
- Excessive use of irrigation water many a times results in water-logging.
- Deliberate damage to water outlets.
- Deliberate utilization of area 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 etc.
- 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.

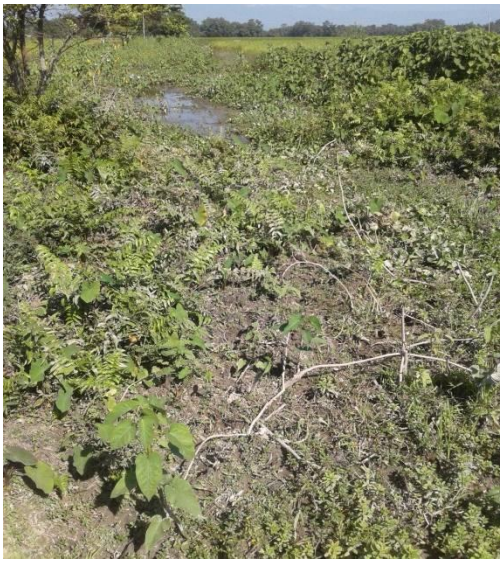
- Low technical exposure of the officials of Irrigation Department at grass root level.
- Modern Managerial training/ capabilities of the Irrigation Department staff for conflict resolution is lacking.
- Lack of staff.
- Lack of Operation & Maintenance Budget.
- Low motivation of Irrigation Department 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.
- 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.

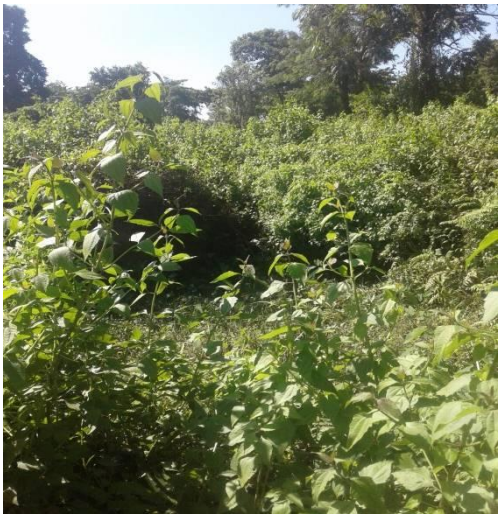
9. Recommendations

- The Sukla irrigation project was completed in the year 1978. The system is in a dilapidated condition and needs restoration in the Headworks, distribution system, outlets etc. Since 38 years have elapsed the data is also not maintained systematically.
- Since the project is partly dysfunctional for the last 2 years due to breakage of aqueduct, it is foremost need to repair the broken aqueduct to recover the lost irrigation potential.
- There is a need to clear the weeds and bushes to keep the system functional. Regular maintenance is required to be adopted.
- Steps may be taken to remove the unauthorised cultivation from canal bed.
- 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.
- Safety measures should be provided.
- Adoption of PIM.
- Enhance the role of Women in water management. It is essential for survival.
- Renovation of system is required. Selective lining of canal may be undertaken.
- Practice of giving incentive for less water consuming crop cultivation.
- Proper monitoring shall be enforced which is significantly lagging.

- Conveyance efficiency shall be enhanced by adopting selective lining of canal.
- The project officials have shown their interest to make the upper reaches of canal system lined and for the purpose have requested the state govt to provide additional funds for the purpose.
- Control and Measuring devices including modular outlets to be installed to prevent pilferage
- 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.
- Third party technical and financial monitoring to ascertain proper utilization of manpower, budget and upkeep of system at project level on regular basis.

10. Photographs of affected outlets

		
Photograph of Outlet No: D1018		Photograph of Outlet No:D1019
		
Photograph of Outlet No:D1043		Photograph of Outlet No:D1044

		
Photograph of Outlet No:D1045		Photograph of Outlet No:D1046
		
Photograph of Outlet No:D1064		Photograph of Outlet No:D1065

		
Photograph of Outlet No:D1075		Photograph of Outlet No:D1076
		
Photograph of Outlet No:D1077		Photograph of Outlet No:D1078

		
Photograph of Outlet No:D1079		Photograph of Outlet No:D1080
		
Photograph of Outlet No:D1081		Photograph of Outlet No:D1082

		
Photograph of Outlet No:D1083		Photograph of Outlet No:D1084
		
Photograph of Outlet No:D1085		Photograph of Outlet No:D1086

		
Photograph of Outlet No:D1096		Photograph of Outlet No:D1097
		
Photograph of Outlet No:D1098		Photograph of Outlet No:D1099

		
Photograph of Outlet No:D1100		Photograph of Outlet No:D1104
		
Photograph of Outlet No:D1105		Photograph of Outlet No:D1106

		
Photograph of Outlet No:D1107		Photograph of Outlet No:D1108
		
Photograph of Outlet No:D1109		Photograph of Outlet No:M3D1005

		
Photograph of Outlet No:M3D1006		Photograph of Outlet No:M3D1007
		
Photograph of Outlet No:M3D1008		Photograph of Outlet No:M5D1003

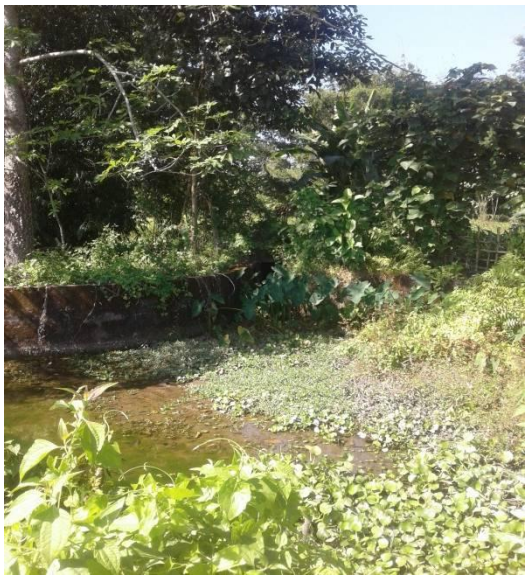
		
Photograph of Outlet No:D2015		Photograph of Outlet No:D2036
		
Photograph of Outlet No:D2043		Photograph of Outlet No:D2044

		
Photograph of Outlet No:D2045		Photograph of Outlet No:D2057
		
Photograph of Outlet No:D2080		Photograph of Outlet No:D280A

		
Photograph of Outlet No:M1D2006		Photograph of Outlet No:M1D2007
		
Photograph of Outlet No:M1D2008		Photograph of Outlet No:M1D2010

		
Photograph of Outlet No:M2D2003		Photograph of Outlet No:M2D2006
		
Photograph of Outlet No:M2D2009		Photograph of Outlet No:M2D2010

		
Photograph of Outlet No:M2D2011		Photograph of Outlet No:M2D2017
		
Photograph of Outlet No:M2D2018		Photograph of Outlet No:S1M2D2001

		
Photograph of Outlet No:M3D2005		Photograph of Outlet No:S1M3D2003
		
Photograph of Outlet No:S2M3D2001		Photograph of Outlet No:S3M3D2001

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 Comments of CWC

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 acertained. 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.	IPU at minor level is not available however consolidated IPC and IPU position at distributory level for the five years is given in Annexure-I.
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.	Corrected on page No. 3. Error is regretted.

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 understanding of Scope of work by AFC and the brief details are given in para 2 of the report
22	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.	Arithmetic Checks carried out suitably.

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.