Irrigation Modernization to Build Resilience and Adapt to Climate Change

ADB's Experience in Irrigation Modernization in India

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Technical Assistance supported by ADB

- National Water Use Efficiency Improvement Support Program **(NWUEISP)** (2013-14): Identified measures to assess and improve water use efficiencies on MMI schemes, and

- The Innovations for More Food with Less Water **(MFLW)** studies (2015): Proposed integrated management of surface and groundwater, and introduction of modern irrigation technologies including SCADA, micro irrigation, electrification and pre-paid metering.

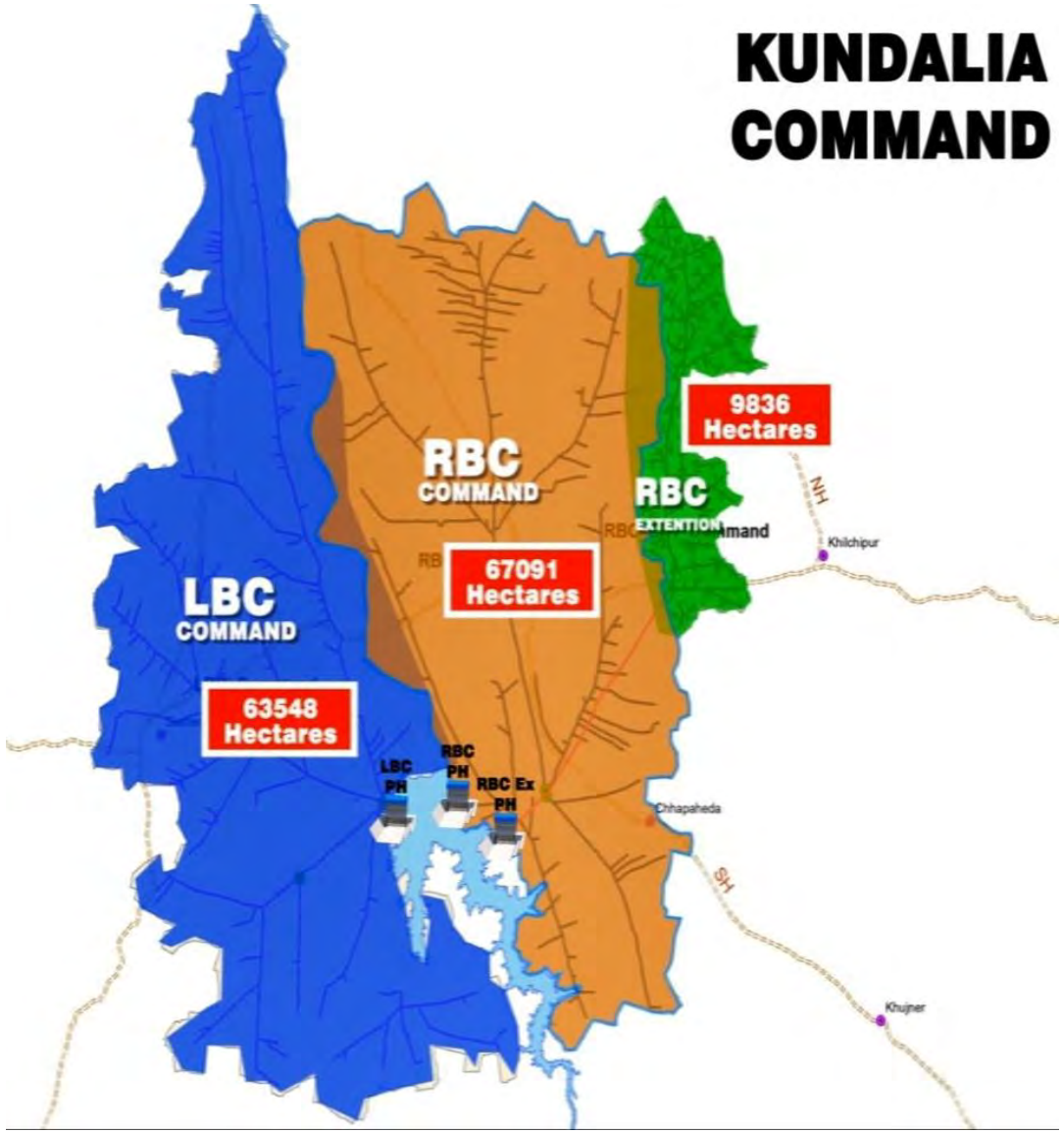
- Support for Irrigation Modernization **(SIMP)** (2020-ongoing) A technical assistance led by Ministry of Jal Shakti (MOJS), Govt of India.

Support for Irrigation Modernization Program (SIMP)

- ✓ Led by India's Ministry of Jal Shakti (MOJS) and supported by ADB technical assistance
- ✓ Central program office under Central Water Commission MOJS and project offices in the State Water Resources Departments
- ✓ Team members comprised government staff and international and national consultants
- ✓ The SIMP was launched in December 2020 to support Indian states in designing modernization investments
- ✓ A framework for MMI modernization and strategy developed in a phased manner:
  - ✓ Phase 1: SIMP framework developed
  - ✓ Phase 2: Irrigation Modernization Plans (IMPs) prepared for 1st batch projects
  - ✓ Phase 3: Project design and readiness for investment
  - ✓ Phase 4: Implementation, monitoring and evaluation
- ✓ 57 proposals received from 14 States and 2 Union Territories
- ✓ Four schemes selected for modernization, with total command area of 246,000 ha and investment amounts estimated to be $569 million or $2,332/ha
  - ✓ Loharu, Haryana (130,000 ha)
  - ✓ Palkhed, Maharashtra (42,000 ha)
  - ✓ Purna, Maharashtra (58,000 ha)
  - ✓ Vanivilasa Sagara, Karnataka (16,000 ha)

Loan 3662-IND: Madhya Pradesh Irrigation Efficiency Improvement Project (MPIEIP)

- ADB project, commissioned in July 2024.
- Pumped LIS schemes on LB and RB supply water to Delivery Chambers for distribution by gravity pipelines to about 125,000 ha.
- Pipes: MS, HDPE.
- Duty: 0.45 l/s/ha. Mixed cropping.
- Full SCADA with Outlet Management System (OMS) with flow and pressure control.
- Also, Rotation Management System (RMS) at Zones and Village Units.
- Operation: 24/7 flow of 13.5 l/s to 30 ha Chaks.
- Rotational supply of 4.5 l/s to 2 subchaks at a time.
- WUA – 3,000 to 4,000 ha
- Layout Tiers: - ~6,000 ha, Zones - 300 ha Village Units- 30 ha Chaks (OMS)- 5 ha Subchaks-1 ha Farms



Summary

Topic	Description
Financing Plan	Project Cost: $535.71 Million (ADB: $375 million and Counterpart: $160.71million)
Project Description	The MPIEIP is designed to support higher irrigation efficiency and expansion of irrigation in MP. It will focus on developing 125,000 hectares of new, highly efficient and climate resilient irrigation networks and productive command area under the Kundalia Irrigation Project (KIP).
Impact	• India farmers' income doubled by 2023 ; India's "more crop per drop" achieved • Resilience of farmers in the project area to ongoing and uncertain future climate change increased
Outcome	Higher irrigation efficiency, agricultural water productivity and climate resilience in MP achieved
Outputs	• KIP infrastructure constructed • KIP performance-based operation and maintenance established • Farmers capacity for rapid uptake of micro-irrigation technology in the KIP command enhanced
Finance PLUS	**Introduction of innovative irrigation system:** The project involves designing and constructing a very large scale pressurized and automated irrigation system allowing considerable gains in WUE. **Design-build-operate (DBO) contract modality:** There are very few examples of irrigation DBO contracts in India and none on such large systems and with such a long MOM period.
Climate Finance	It is a climate adaptation Type 2B category project based on water savings through higher irrigation efficiency and agricultural water productivity resulting in climate resilience.

Components of Project

KUNDALIA IRRIGATION PROJECT

Client	Govt. of M.P. Water Resource Department	
Funded by	Asian Development Bank	
DBO Contractor	Larsen & Toubro Limited	
	Kundalia LB	Kundalia RB
Contract Agreement No	CW-1, Dated: 18.04.2018	CW-2, Dated: 06.09.2018
Contract Start	Start: 18.04.2018	Start: 06.09.2018
Contract Start	Exp. Completion 30.04.2024	Exp. Completion 30.04.2024
Contract Value	₹1200 Cr (incl O&M 10.5Cr)	₹1394 Cr (incl O&M 33.5Cr)
Culturable Command Area	63,548 Hectares	67,091 Hectares
Beneficiary Villages	146 Nos. Villages	210 Nos. Villages
Beneficiary Farmers	1.71 Lacs Farmers	1.78 Lacs Farmers

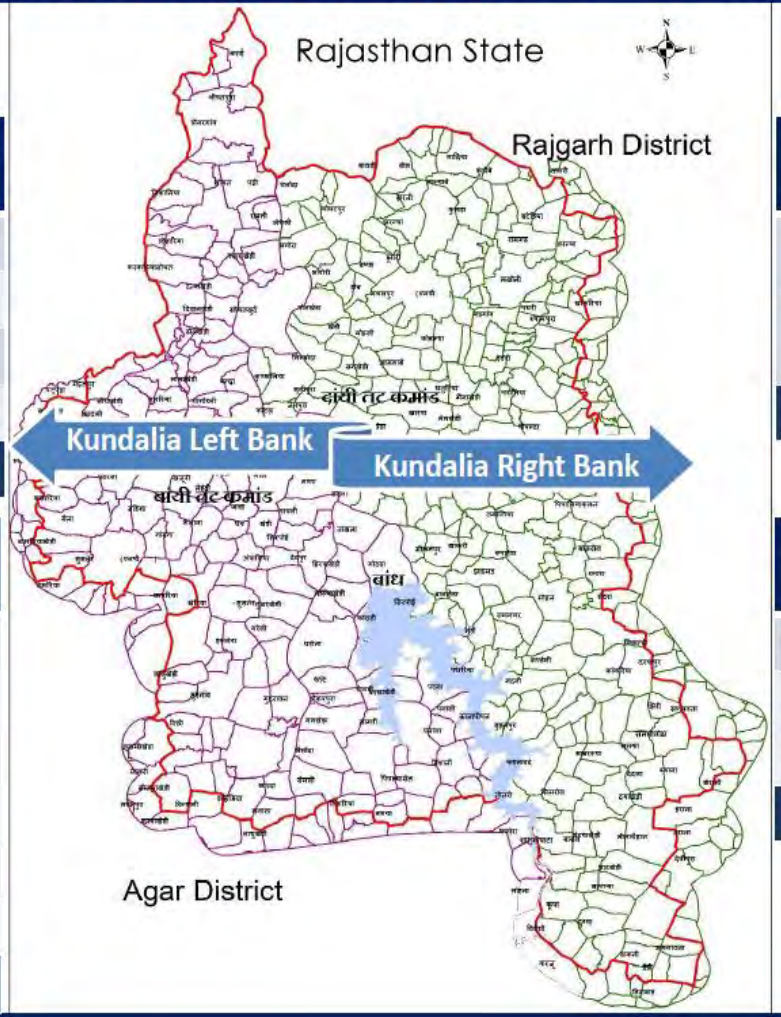
Components of Project

KUNDALIA IRRIGATION PROJECT – Command Area

Kundalia LB

District	Tehsil	CCA in HA	Village In Nos
Agar-Malwa	Susner	35185	88
	Nalkheda	25795	54
	Agar	199	1
Rajgarh	Jirapur	1416	3
Total →		62,595	146

Water from	Zone	CCA in HA	Village In Nos
DC-1B	3	6598	54
	2	5518	12
DC-1A	4	7033	11
	1	22926	17
DC-2	5	13927	36
DC -3	6	6593	16
Total →		62,595	146

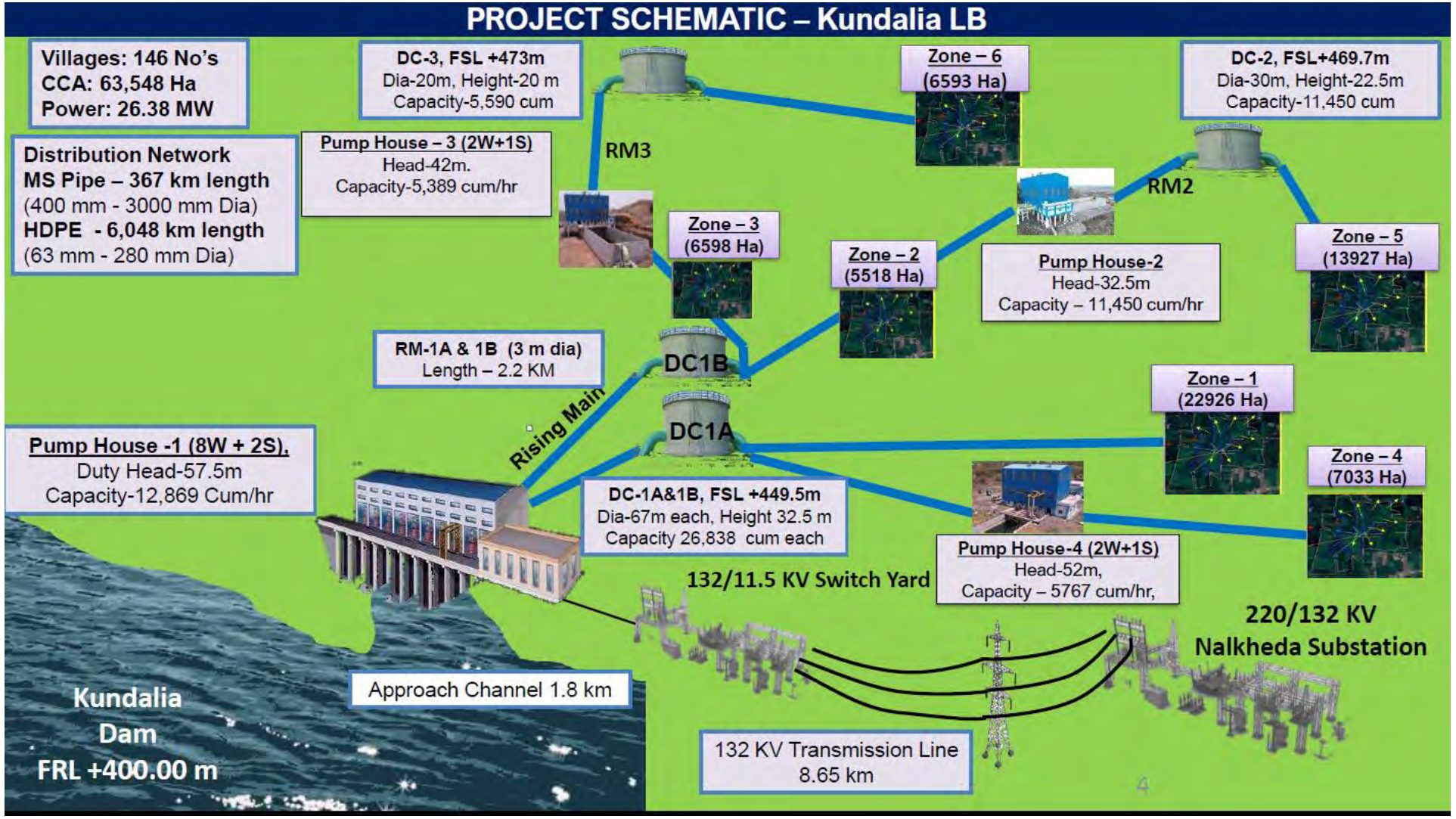


Kundalia RB

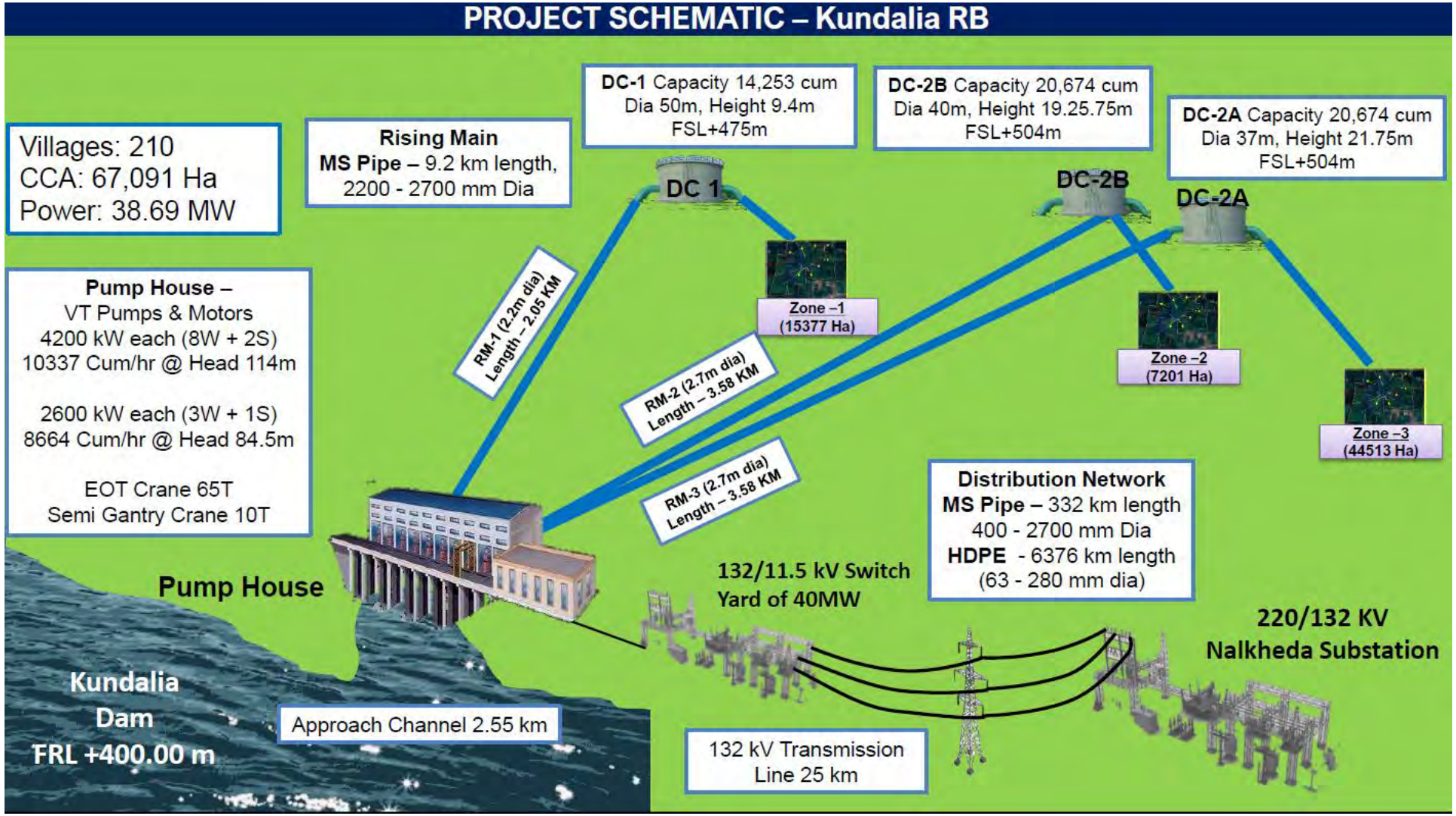
District	Tehsil	CCA in HA	Villages In Nos
Rajgarh	Jirapur	55,884	181
	Sarangpur	5,761	16
	Khilchipur	5,446	13
Total →		67,091	210

Water from	Zone	CCA in HA	Villages In Nos
DC-1	1	15,377	51
DC-2A & DC-2B	2	7,201	16
	3	44,513	143
Total →		67,091	210

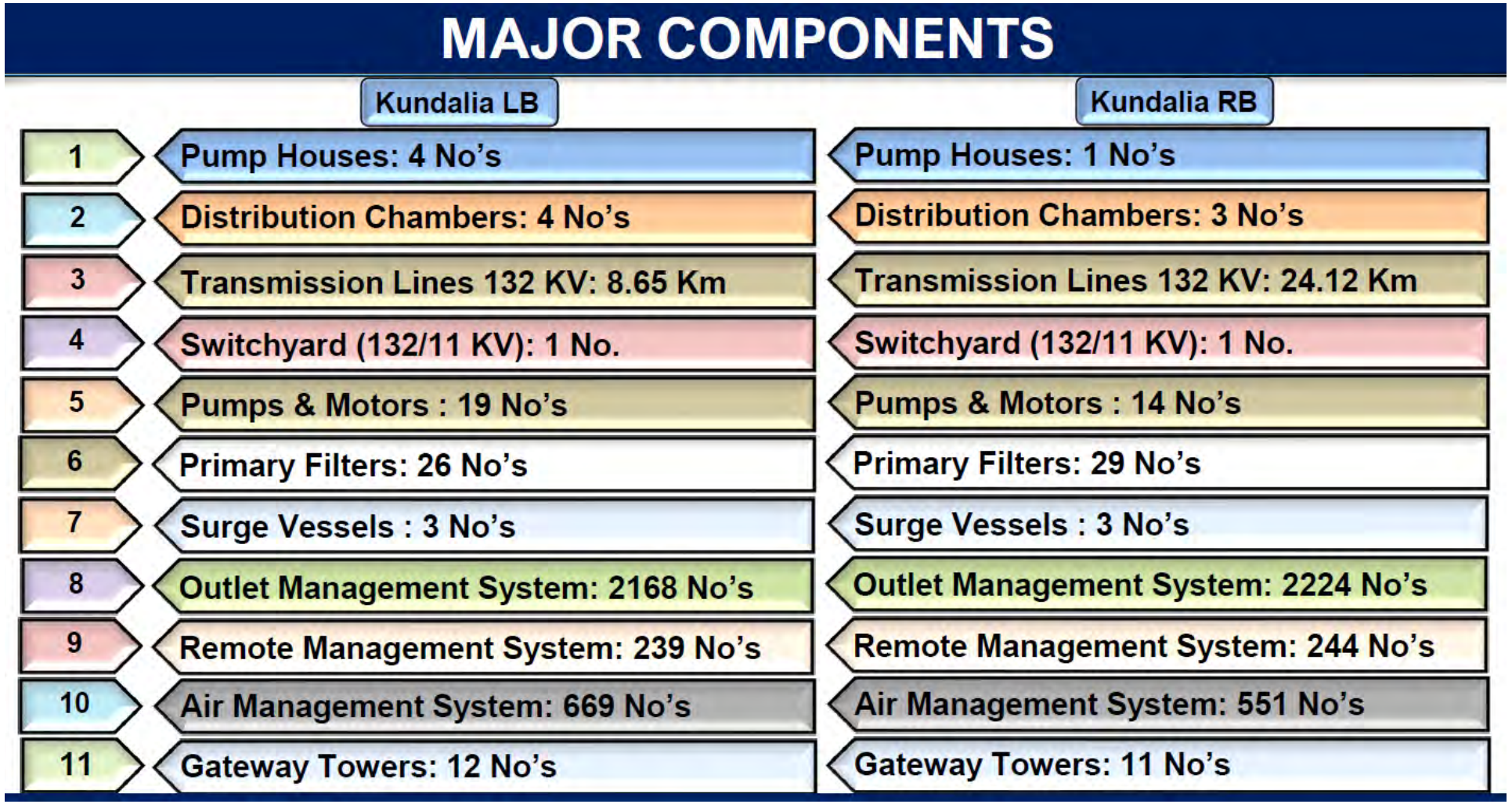
Components of Project



Components of Project



Components of Project



Components of Project

KUNDALIA IRRIGATION PROJECT - LEFT BANK (PUMP HOUSE & ANCILLARY BUILDINGS)


Approach Channel


Pump House-1


Ancillary Buildings


Panel Room


PLC Room

Pump House - 1 (Salient Features)	
Approach Channel	1.78 Km
PH-1 Dimensions	L- 81.6mxW-26.8m,31.2 m BGL)
Vertical Turbine Pump	10 No's (12,869 Cum/hr)
Duty Head & Speed	57.5m & 597 rpm
Governing Water Levels	Max +400m & Min+380m
Induction Motor (11KV)	10 No's (2,650 KW)
EOT Crane	1 No (60 Ton, Span-15m, Bay L-71.5 m)
Trash Rack Screen	10 Sets
Power Requirement	26.38 MW
Switch Yard	1 No (132/11.5 KV)
Transformers	2 Nos (30 MVA each)
Electrical Building	4 No's (each at PH)
VFD Panel & Soft Stater	14 No's VFD and 5 No's Soft Stater
Workshop Building	1 No
Air Handling Unit	4 No's (each at PH)
Fire Water PH & Tank	1 No + 1 No

Components of Project

KUNDALIA IRRIGATION PROJECT - RIGHT BANK (PUMP HOUSE & ANCILLARY BUILDINGS)

Pump House - 1 (Salient Features)	
Approach Channel	2.55 Km
Pump House	1 No (L-105mxW-17m,28.7m BGL,18 m AGL)
Vertical Turbine Pump	10 Nos(10,337cum/hr)&4Nos (8.664cum/hr)
VT Pump Head & Speed	114m & 84.5m
Lifting Water Level	Max- 400 m and Min-380m
Induction Motor (11KV)	10 No's (4200 KW) & 4 No's (2600 KW)
EOT Crane	1 No (65 Ton, Span-15m, Bay L-70 m)
Trash Rack Screen	14 Sets (4.75m X 28.7m with guide frame)
Power Requirement	40 MW
Switch Yard	1 No (132 KV) (Area 3200 sqm)
Transformers	2 Nos (50 MVA each)
Electrical Building	1 No's
VFD Panel & Soft Stater	11 No's VFD and 3 No's Soft Stater
Workshop Building	1 No (Area 450 sqm)
Air Handling Unit	1 No's
Fire Water PH & Tank	1 No + 1 No

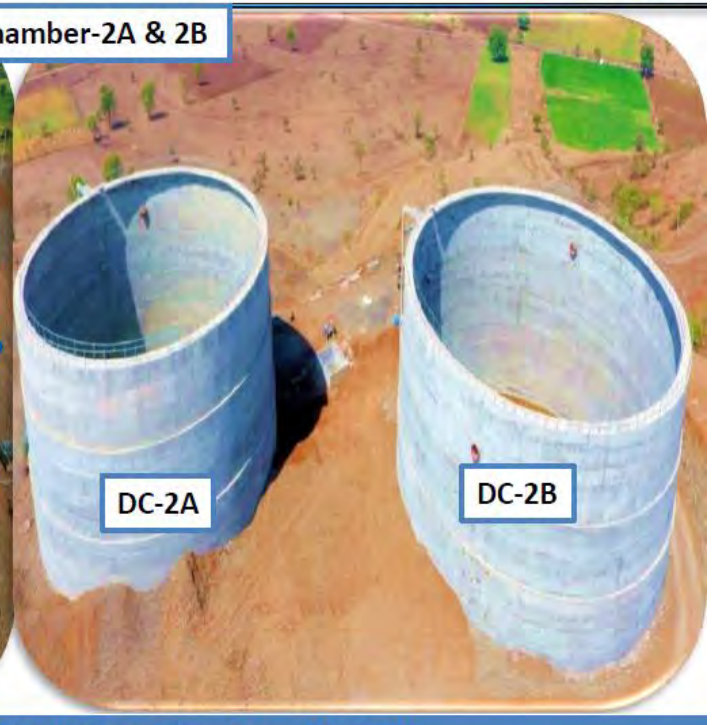
Components of Project

KUNDALIA IRRIGATION PROJECT - LEFT BANK (DISTRIBUTION CHAMBERS)

	Distribution Chamber-1A/1B	Distribution Chamber-2	Distribution Chamber-3
Dimension	Inner Dia 67.5m, Height 32.5m	Inner Dia 30m, Height 22.4m	Inner Dia 20m, Height 20 m
Storage Capacity	26,838 cum each	11,452 cum	5,390 cum
Discharge	14.3 Cum/s	6.36 Cum/s	2.9 Cum/s
Full Supply Level	+449.5 m	+469.7 m	+473 m

Components of Project

KUNDALIA IRRIGATION PROJECT – RIGHT BANK (DISTRIBUTION CHAMBERS)

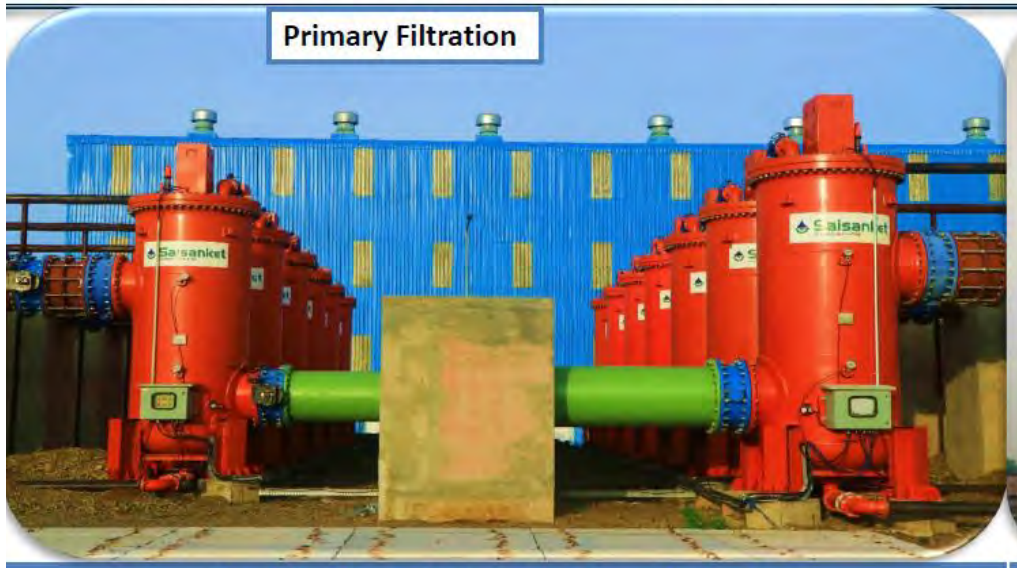


Distribution Chamber - 1	
Dimension	Inner Dia 50m, Height 9.4m
Capacity	Capacity 14,253 cum
Discharge	7.22 Cum/s
Full Supply Level	+475 m

Distribution Chamber – 2A & 2B	
Dimension	DC 2A (Inner Dia 37m, Height 21.75m from GL) DC-2B (Inner Dia 40m, Height 19.25m from GL)
Capacity	Capacity 20,674 cum (for each)
Discharge	11.49 Cum/s
Full Supply Level	+504 m

Components of Project

KUNDALIA IRRIGATION PROJECT - PRIMARY FILTRATION & SURGE PROTECTION



Kundalia LB - Self Cleaning Primary Filtration		Kundalia RB - Self Cleaning Primary Filtration	
Primary Filtration	26 No's (RM 1A-13 no's, RM 1B -13nos)	Primary Filtration	29 No's (RM 1-7 no's, RM 2B & 2B -22nos)
Filtration Capacity	200 micron	Filtration Capacity	200 micron
Operation	Manual and Auto Mode through PLC	Operation	Manual and Auto Mode through PLC
Status	Completed (100%)	Status	Completed (100%)
Kundalia LB - Surge Protection		**Kundalia RB - Surge Protection**	
Bladder Vessel	2 No's 20 Cum at PH-1 and 1 No's 5 Cum at PH-4	Bladder Vessel	1 No 15 Cum & 2 No's 40 Cum
Status	Completed (100%)	Status	Completed (100%)

Components of Project

KUNDALIA IRRIGATION PROJECT - OUTLET MANAGEMENT SYSTEM

Outlet Management System (OMS) at every 30Ha		
Dimensions(m) (LxBxH)	2.8 x 0.95 x 1.3	
Components	PFCMD (Pressure Flow Control and Monitoring device), Air Valve with Isolation Valve, Strainers, Controller with Pressure Transmitter, Solar Panel and Batteries, Enclosure Cabinets	
Pressure & Head at 30 Ha	25 m & 2.5 Kg/cm2	
Pressure & Head at 1 Ha	20 m & 2.0 Kg/cm2	
Discharge	0.45 LPS/Ha	
	Kundalia LB - OMS	Kundalia RB - OMS
Scope	2168 Nos	2224 Nos
Status	2129 Nos Completed (98%)	2180 Nos Completed (98%)

Components of Project

KUNDALIA IRRIGATION PROJECT - REMOTE MANAGEMENT SYSTEM

Remote Management System (RMS) at every 300Ha		
Components	PFCMD (Pressure Flow Control and Monitoring device), Air Valve, Controller, Solar Panel and Batteries, Enclosure Cabinet	
RMS Size	200mm to 900mm	
Controlling Capacity (Area)	150 Ha to 300 Ha	
	Kundalia LB	Kundalia RB
Scope	239 Nos	244 Nos
Status	211 Nos Completed (88%)	225 Nos Completed (92%)

Components of Project

KUNDALIA IRRIGATION PROJECT - AIR MANAGEMENT SYSTEM

Kundalia LB - AMS	
Components	Air Valve with Isolation Gate Valve, Pressure Transmitter, Controller, Solar Panel/Batteries, Enclosure Cabinet
Scope	669 Nos
AMS Size	50 mm to 200 mm
Status	560 Completed (84%)

Kundalia RB - AMS	
Components	Air Valve with Isolation Gate Valve, Pressure Transmitter, Controller, Solar Panel/Batteries, Enclosure Cabinet
Scope	551 Nos
AMS Size	50 mm to 200 mm
Status	367 Completed (67%)

Components of Project

KUNDALIA IRRIGATION PROJECT – LORA TOWERS

Kundalia LB - Gateway Towers	
Scope	12 Nos
Mode of Communication	LoRA (Long Range communications)
Purpose	Communication between Main control room with Field Control Units
Status	9 Nos Completed (75%)

Kundalia RB - Gateway Towers	
Scope	11 Nos
Mode of Communication	LoRA (Long Range communications)
Purpose	Communication between Main control room with Field Control Units
Status	4 Nos Completed (33%)

Components of Project

KUNDALIA IRRIGATION PROJECT – IMPLEMENTATION SUPPORT

Description	Kundalia LB	Kundalia RB
Number of Villages	146 Nos	210 Nos
Farmer Support Center	4 Nos	4 Nos
Trainings of awareness about project (T1)	In 146 villages	In 210 villages
Importance of Micro Irrigation Scheme (T2)		
Training and Demo at Field (T3)		
Farmers Field School (FFS) of 30 Ha each	21 Nos	22 Nos
Formation of Water User Association	239 Nos (300 Ha each)	244 Nos (300 Ha each)

Components of Project

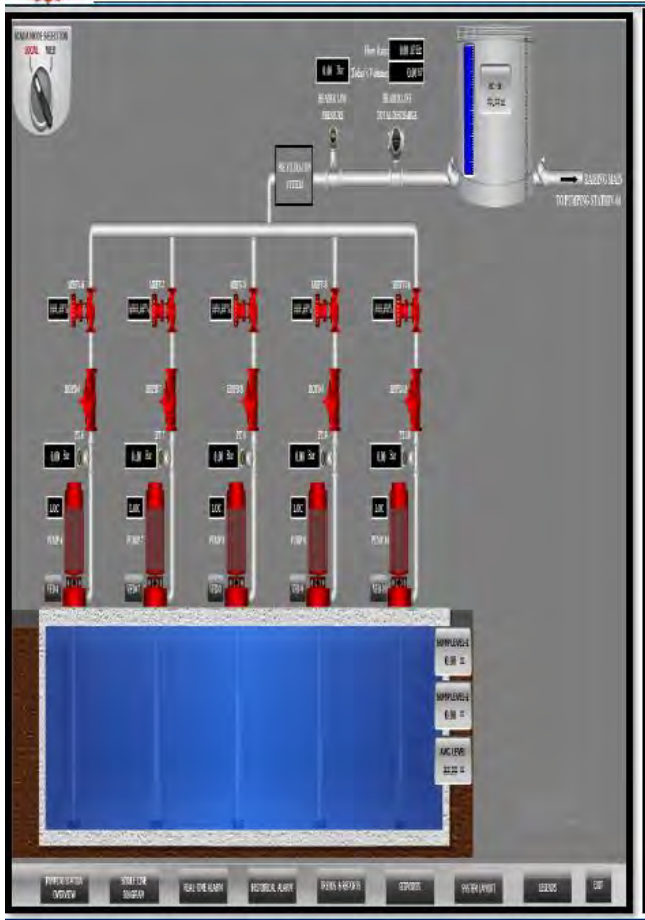
KUNDALIA IRRIGATION PROJECT - TESTING & FLUSHING

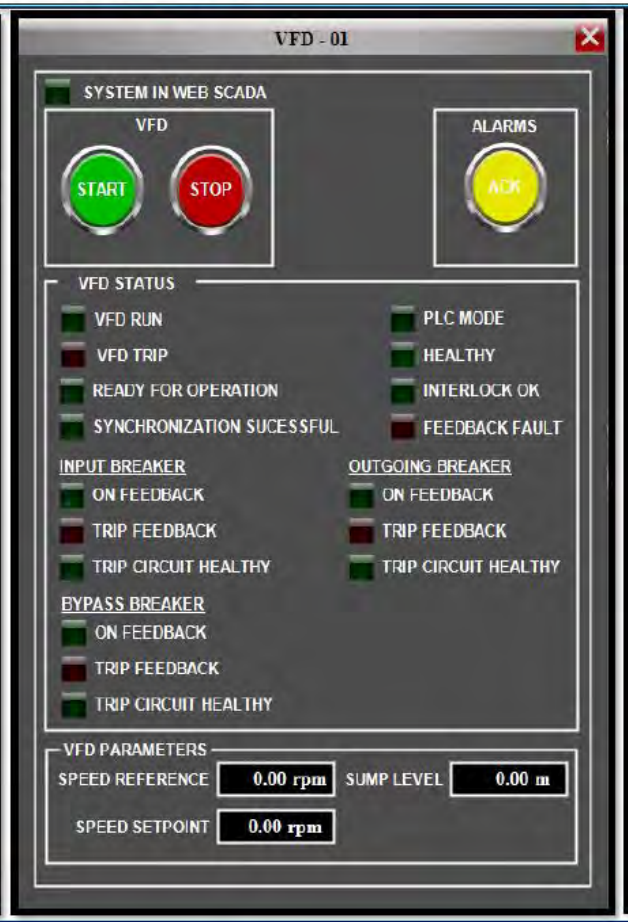
Kundalia LB (Testing & Flushing) in Ha				
Zones	Scope	Comp	Balance	%
Zone-1	22,926	1,959	20,967	9%
Zone-2	5,518	1,988	3,530	36%
Zone-3	6,598	5,840	758	89%
Zone-4	7,033	3,787	3,246	54%
Zone-5	13,927	3,508	10,419	25%
Zone-6	6,593	5,103	1,490	77%
Total ➔	62,595	22,185	40,410	35%

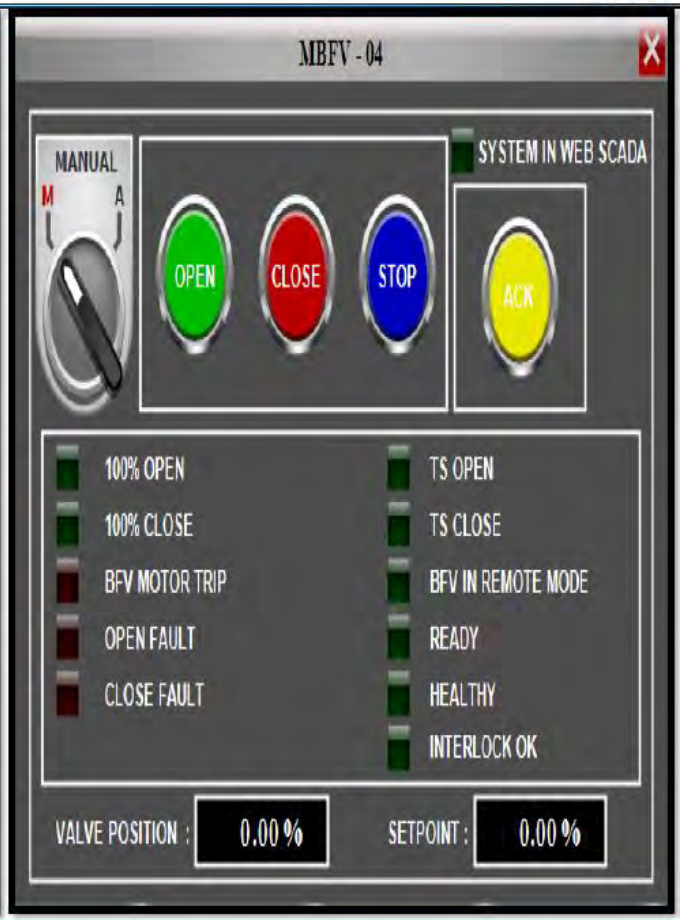
Kundalia RB (Testing & Flushing) in Ha				
Zones	Scope	Comp	Balance	%
Zone-1	15,377	15,377	-	100%
Zone-2	7,201	7,201	-	100%
Zone-3	44,513	7,872	36,641	18%
Total ➔	67,091	30,450	36,641	45%

Components of Project

LOCAL SCADA AT PUMP HOUSES

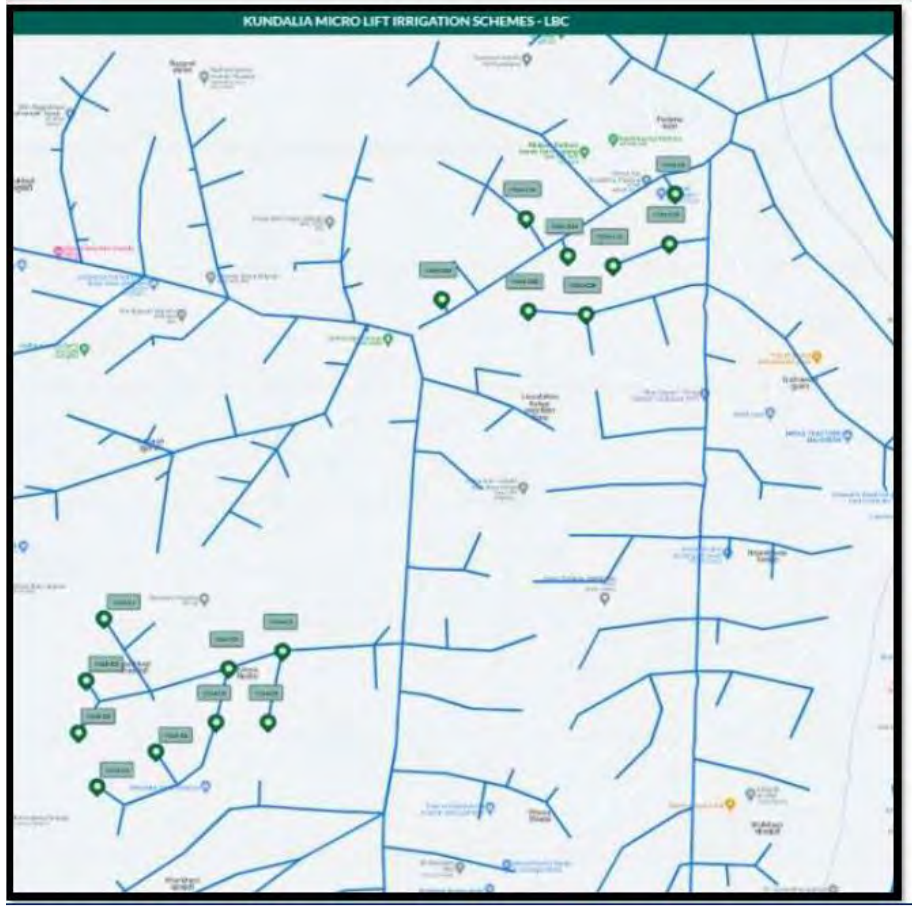


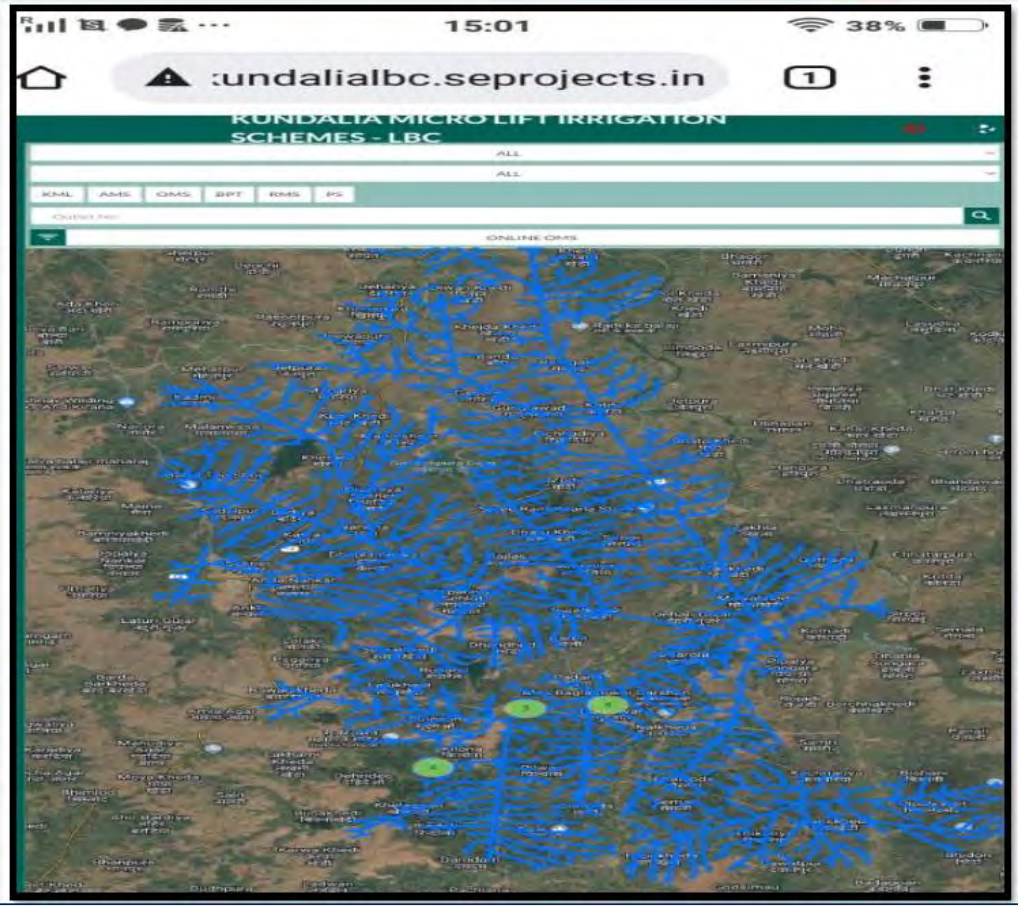




Components of Project

WEBSCADA – PIPELINE DISTRIBUTION NETWORKS





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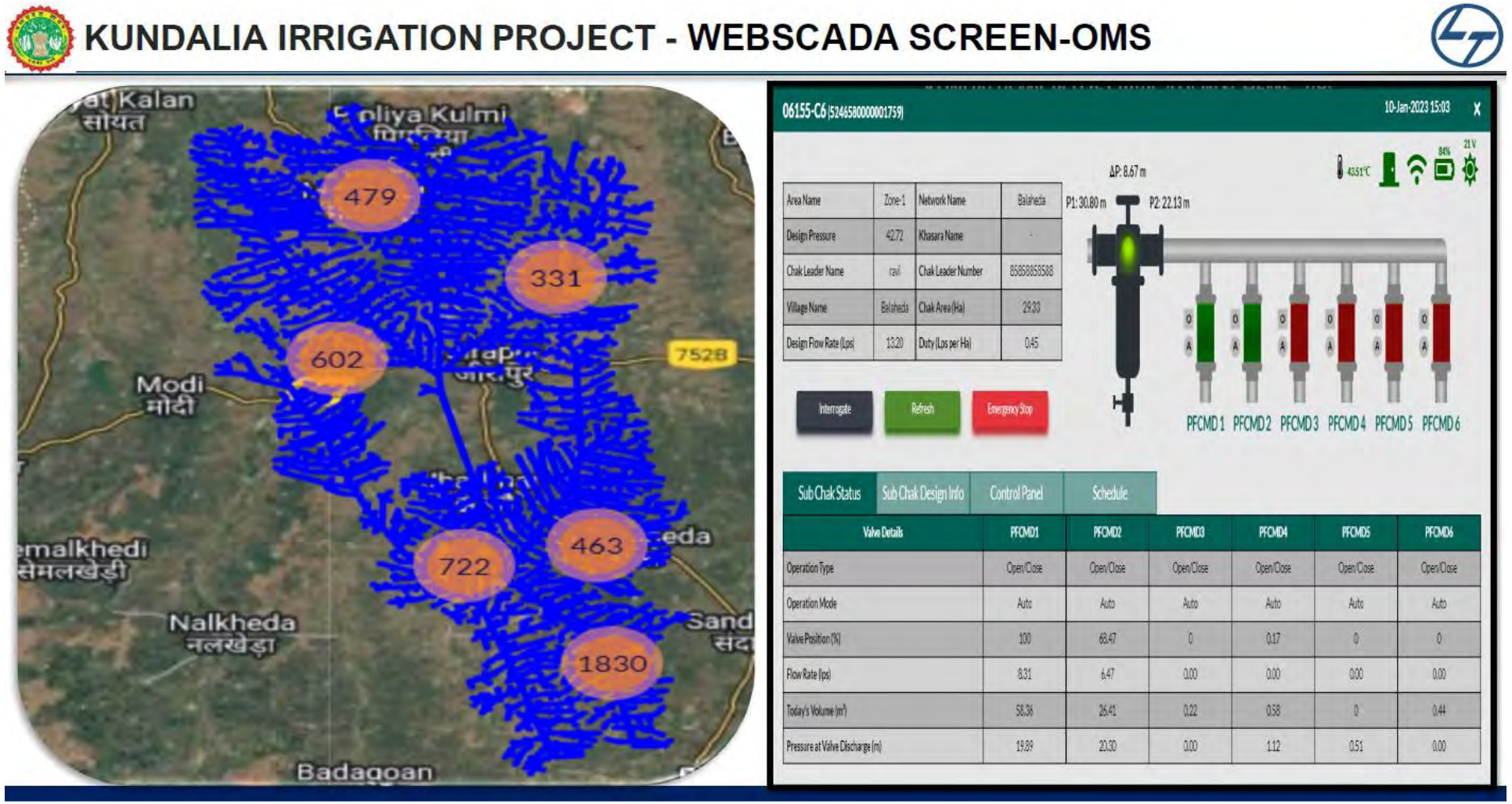
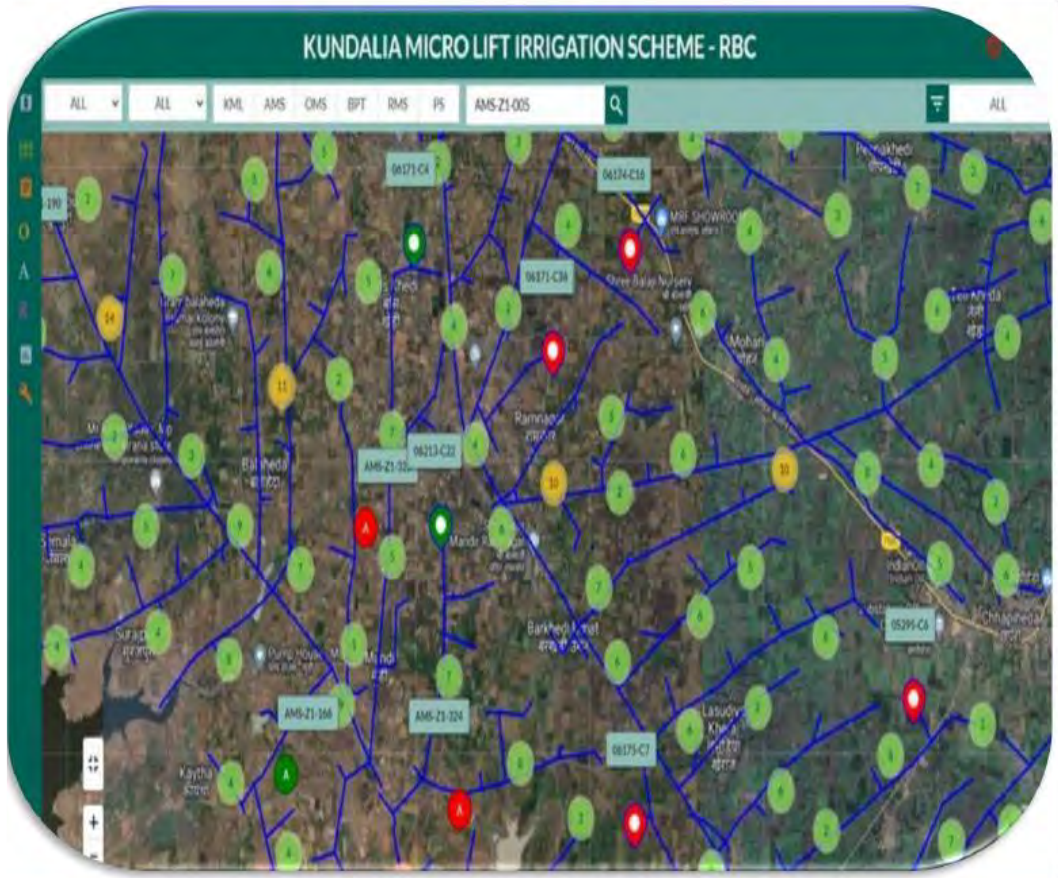
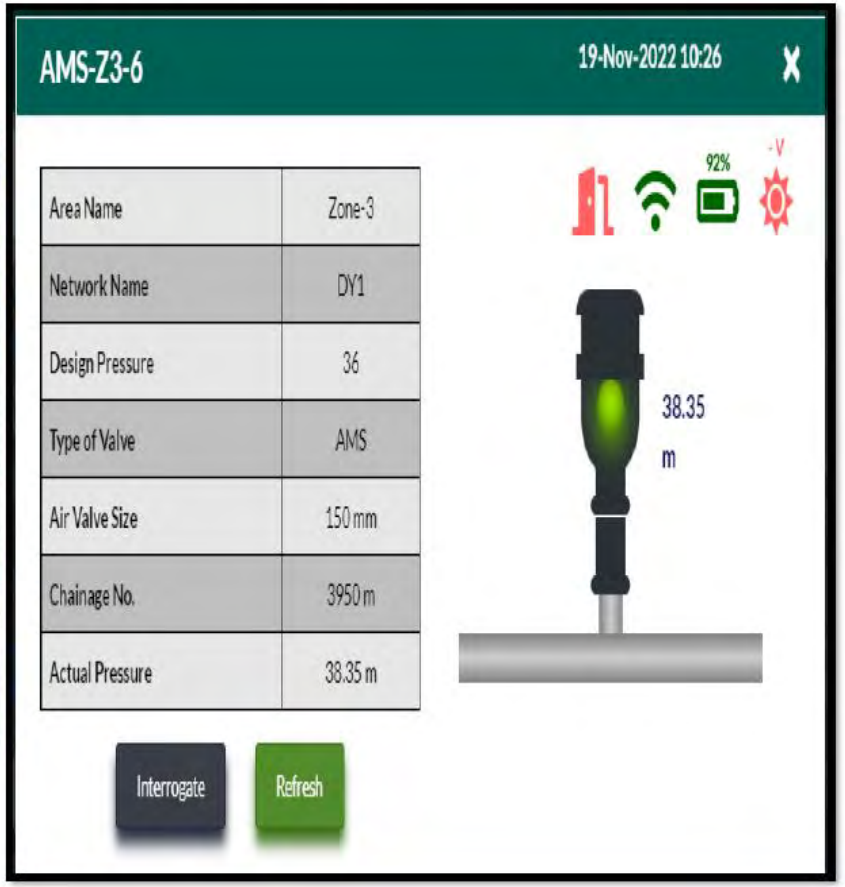


Components of Project

KUNDALIA IRRIGATION PROJECT - WEBSCADA SCREEN-AMS





Components of Project

Thank you

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