



AN  
OVERVIEW  
OF  
TANAHU HYDROPOWER PROJECT

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TANAHU HYDROPOWER PROJECT  
TRADE TOWER, THAPATHALI, KATHMANDU

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# OUT LINE OF THE PRESENTATION

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# INTRODUCTION

- Pre-feasibility study was conducted by NEA in 2001.
- Upgraded feasibility study carried out by JICA in a period from February 2005 to June 2007.
- Installed capacity of 122 MW was identified in pre-feasibility study and optimized to 127 MW in upgraded feasibility study.
- Installed capacity of 140 MW (Maximum) established in detail engineering study.
- Tanahu Hydropower Limited (THL) was established in 2012 as a subsidiary company of Nepal Electricity Authority (NEA) as special purpose vehicle (SPV) to execute Tanahu Hydropower Project.



# INTRODUCTION CONT...

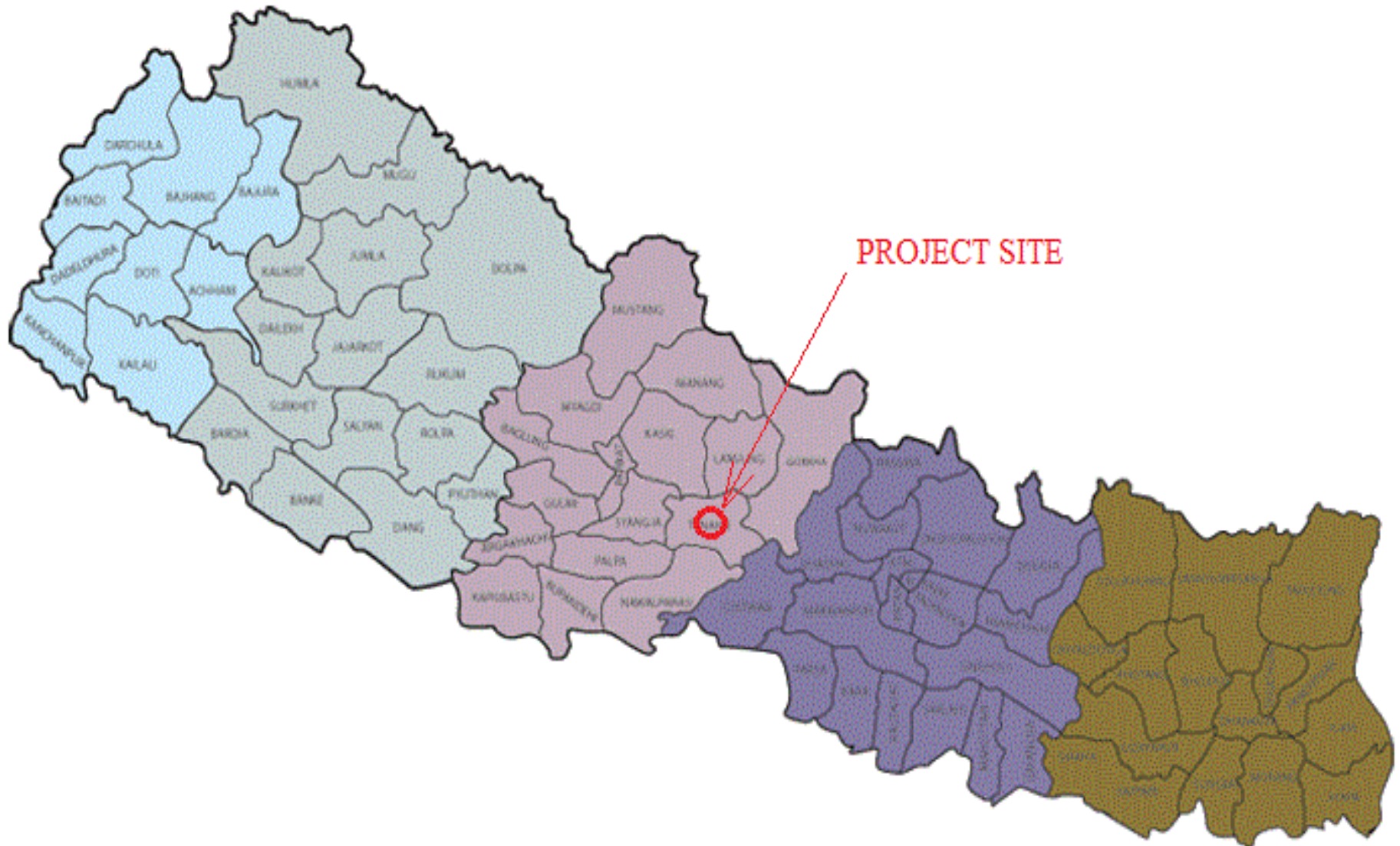
- Project site located 150 km west of Kathmandu on Seti River near Damauli of Tanahu District. The project is seasonal storage type capable of supplying peak power for minimum of 6 hours daily in dry season.
- Power will be evacuated through 36 km long 220 kV D/C transmission line to New Bharatpur sub-station.
- Estimated Annual energy 585.7 GWh (Primary Energy: 266.2 GWh, Secondary Energy: 319.5 GWh) for first 10 year and estimated that it will decreased by 16% after 10 years.
- Will be equipped with sediment flushing system
- Construction will be started in mid of 2017 and will be completed in end of 2021.

# OBJECTIVE OF PROJECT

- Objective of Tanahu Hydropower Project are:
  - ❑ To construct hydropower plant having installed capacity of 140 MW
  - ❑ To construct 220 kV Damauli Bharatpur transmission line
  - ❑ Implementation of Rural Electrification in 17 VDC of Tanahu District.
  - ❑ Community development program in project area
  - ❑ Resettlement of project affected households

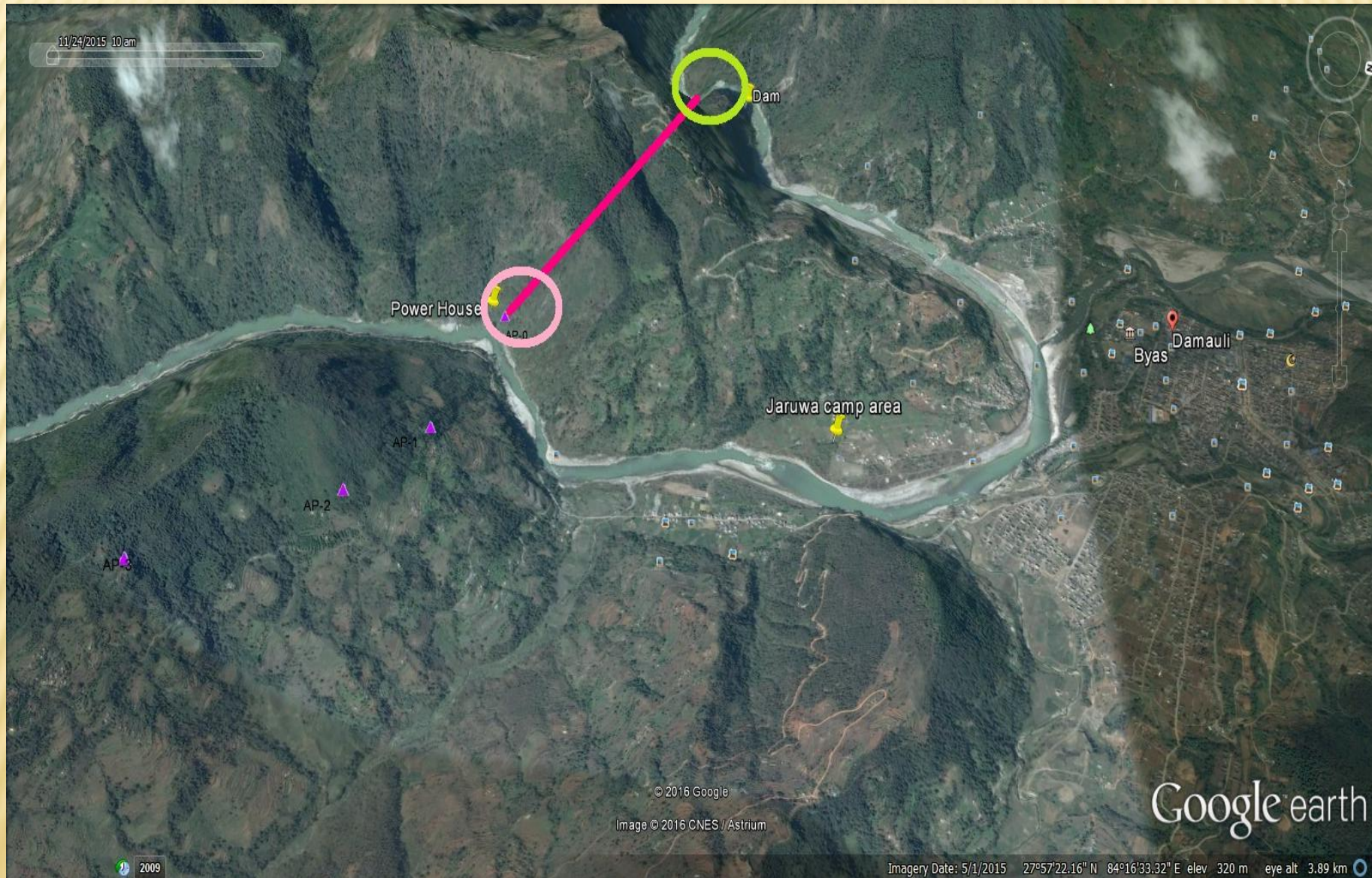


# LOCATION MAP





# PROJECT SITE IN GOOGLE MAP





# LOCATION OF PROJECT

➤ Located within:

❑ Longitude:  $84^{\circ}17'30''$  to  $84^{\circ}04'00''$  E

❑ Latitude:  $28^{\circ}00'00''$  to  $27^{\circ}55'15''$  N

➤ Project site lies in middle reach of the Seti River.

➤ Catchment area at the dam site is 1,502 sq.km.

➤ Dam will be at 1 km upstream of confluence of Seti & Madi river

➤ Powerhouse will be at 3 km downstream of confluence.

➤ Gross storage capacity of reservoir = 295.1 million cu.m.

➤ The design discharge is 127.4 cu.m./sec



# PROJECT FINANCING

- The **project** is being **funded** as per below:
- **ADB** :150 Million USD
- **JICA**: 183 Million USD
- **EIB**: 85 Million USD
- **GoN/NEA**: 87 Million USD
- **ADB loan** will be used for the **head works**, **rural electrification**, **transmission line**, **environment and social safeguard program**, **Project Supervision Consultant**.
- **JICA loan** for **water ways and power house** including hydro-mechanical and electromechanical equipments.
- **GON/NEA** fund for pre-construction infrastructure like access road, bridge, construction power, land acquisition etc.

# UPDATED SALIENT FEATURES OF PROJECT

Item		
Development Plan	Rated Intake Water level	405.0 m
	Rated Tail Water Level	289.6 m
	Rated Gross Head	115.4 m
	Maximum/Rated Effective Head	120.7 m/111.1 m
	Maximum/Rated Discharge	132.8 m <sup>3</sup> /s /127.4 m <sup>3</sup> /s
	Number of Unit	Two (2)
	Installed Capacity	140 MW Rated capacity: 127 MW
	Peak Time	6 hours
Turbine	Type	Vertical Shaft, Francis Turbine
	Number	Two (2)
	Maximum/Rated Output	73,200 kW/64,800 kW
	Revolving Speed	300 min <sup>-1</sup>
Generator	Type	Three-phases, Synchronous Generator
	Number	Two (2)
	Rated Output	84,000 kVA per unit
	Revolving Speed	300 min <sup>-1</sup>
	Frequency	50 Hz
	Rated Voltage	13.2 kV
	Power Factor	0.85 lag



# UPDATED SALIENT FEATURES OF PROJECT Cont...

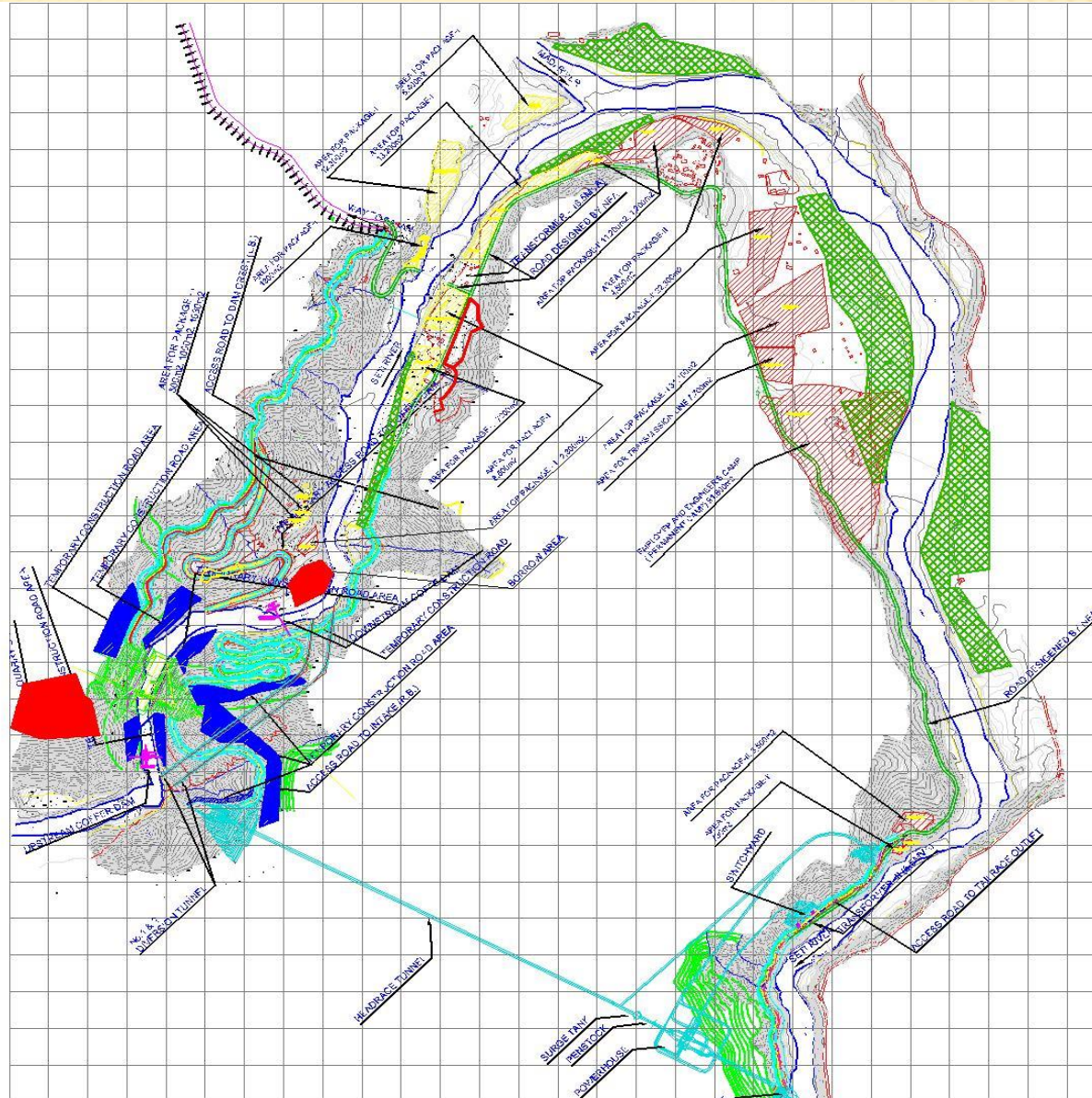
<b>Power Transformer</b>	Type	Indoor, special three-phase, Forced-oil-circulated and forced-water-cooled
	Number	Two (2)
	Rated Output	84,000 kVA
	Rated Voltage	Primary 13.2 kV
		Secondary 220 kV
<b>Switchyard</b>	Type	GIS (Gas Insulated Switchgear)
	Bus System	Double Buses
	Number of Bays	Five (5) bays
	Voltage	220 kV
<b>Generation Facility by Environmental Flow</b>	Rated/Maximum Effective Head	74.3 m/84.3 m
	Discharge	2.4 m <sup>3</sup> /s
	Turbine Type	Horizontal Type, Francis Turbine
	Number of Turbine/Generator	One (1)
	Turbine Rated Output/ Maximum Output	1,584 kW/ 1,793 kW
	Generator Type	Horizontal Type, Three-phase Synchronous Generator
	Generator Maximum Capacity	1,950 kVA
	Distribution Transformer	3-Phase Dry Type, Maximum Capacity 2,500 kVA

# FINANCIAL INDICATORS OF PROJECT

- Estimated Economic Internal Rates of Return (**EIRR**) **12.3 %** (EIRR > Opportunity cost of Capital, i.e. 10%).
- Estimated Financial Internal Rates of Return (**FIRR**) **10.3 % taking 8% interest rate for loan).**
- Repayment period: 25 years after commissioning  
Loan Life Coverage Ratio (LLCR) = 2.0 with expected interest rate of 8% (i.e. LLCR > 1.0)



# GENERAL LAYOUT OF THE PROJECT



# CURRENT ACTIVITIES OF THE PROJECT

- Contract agreement concluded with Project Supervision Consultant (PSC) M/S Lahmeyer International in association with Manitoba Hydro Int. for twelve years.
- PSC Consultant responsible for design review, bid processing, construction supervision and will assist in O/M phase for five years after commissioning.
- Project has entered in pre-qualification stage.
- Recently obtained generation license from Department of Electricity Development (DOED).
- Applied for PPA with NEA.
- Applied for transmission line construction license at DOED.



# CURRENT ACTIVITIES OF THE PROJECT

- Construction of RCC bridge over Seti River completed.
- Construction of access road from National highway to nearby to Project site is ongoing.
- Construction of camp facilities on going
- Construction of construction power supply for Project ongoing.
- Detail survey of Damauli Bharatpur 220 kV transmission line for power evacuation completed.
- Demarcation survey for land acquisition of reservoir area completed.

# CONSTRUCTION OF PROJECT

- Three major Packages for the Construction of the Project
  - Package 1: Head Works
  - Package 2: Water ways, Power House and related equipments (Hydromechanical and Electromechanical)
  - Package 3: Transmission line and substation
- Environmental and Social Management Unit (ESMU) established to address the social and environmental issues in relation to the project.



# SOCIAL AND ENVIRONMENTAL ISSUES

- EIA of Upper Seti Project conducted and approved in 2009.
- IEE of Damauli Bharatpur 220 kV transmission line conducted and approved in 2010.
- Project affected households (HH): 758
- Project affected private land: 112 Hectare (93 Hectare to be permanently acquired, 19 to be leased).
- 7.5 Hectare acquired till date.
- Project affected people: 4257
- HH to be physically displaced: 86 , (25 HH displaced during land acquisition of camp facilities and access road).
- Physically displaced peoples: 538
- Affected number of trees: 4776
- Suspension bridges displacement: 7

# HEAD WORKS AREA





# COMPLETED RCC BRIDGE OVER SETI RIVER





# UNDER CONSTRUCTION ACCESS ROAD TO SITE





# ACCESS ROAD UNDER CONSTRUCTION





# SUBSTATION FOR CONSTRUCTION POWER UNDER CONSTRUCTION





Thank You