



# Thethaitangar Small Hydro Power Project

## Preliminary Feasibility Report



### 1.0 INTRODUCTION

#### 1.1 General

The state of Jharkhand almost comprises hilly terrain mostly of Chhotanagpur plateau and 30% of total area (79,714 sq km) is covered with forest. The normal annual rainfall is 1400 mm. These geographical factors provide a number of Small Hydro Power (SHP) potential sites at waterfalls and rapids in the streams and rivers of Jharkhand.

About 80% of villages in the Jharkhand are yet to see electrical power. It is prudential to harness the SHP potential sites for the electrification of its nearby villages.

In view of above, Jharkhand Renewable Energy Development Agency (JREDA) has entrusted MECON LIMITED for preparation of Preliminary Feasibility Report (PFR) for development of Small Hydro Power (SHP) at 22 sites in Jharkhand.

Thethaitangar SHP site is one of 22 SHP sites, located in the south-western part of Jharkhand. It is situated in the Block Thethaitangar of District Simdega. The Thethaitangar SHP is proposed to utilize the rapid in Thethaitangar Nadi near village Tengartoli.

#### 1.2 Benefits of Small Hydro Power

Harnessed energy has become a symbol of growth and instrument for development. Electric power particularly the small hydro power is a renewable, economically attractive, environment friendly, non-polluting and environmentally benign source of energy. Moreover, the Small Hydro Power is submergence free and has short gestation period. These benefits of SHP have now been sufficiently recognised. The need of the project comes from the benefits of SHP and utilization of resources.



# **Thethaitangar Small Hydro Power Project**

## **Preliminary Feasibility Report**



### **1.3 Aim of report**

Development of small hydro projects requires many stages of technical and financial study to determine if a site is technically and economically feasible. The viability of project is very site specific.

PFR is the first stage of work based on which Detailed Survey and Investigation (DSI) is recommended.

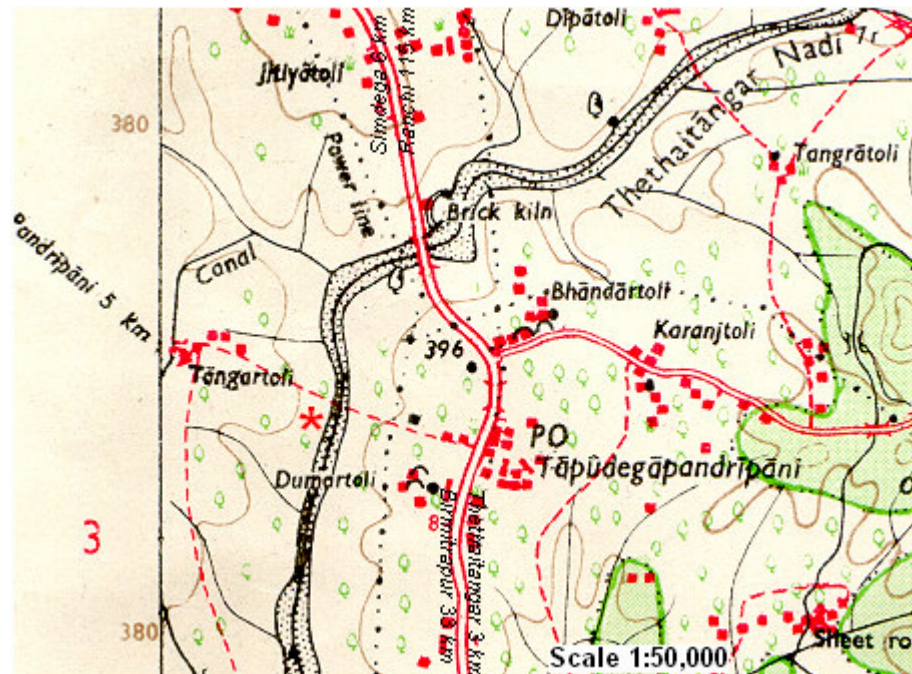
The aim of the report is to examine the adequacy for proceeding to the next stage of work; Detailed Survey & Investigation.

### **1.4 Scope of report**

PFR covers the following activities.

- a) Topo sheet study for tentative planning of general layout of project, delineation of drainage area, and for obtaining idea on the access to site.
- b) Site visit for identification of location of the site, preliminary layout of SHP, preliminary assessment of head, duration of water availability in the stream, and electrification status of nearby villages.
- c) To examine the adequacy for proceeding to the next stage of development.

### 2.0 INDEX MAP





# Thethaitangar Small Hydro Power Project

## Preliminary Feasibility Report



### 3.0 GENERAL INFORMATION

#### 3.1 Location of site

The location of the site is shown in the Index Map. The details of location are as follows.

- a) Village: Tengartoli
- b) Block: Thethaitangar
- c) District: Simdega
- d) State: Jharkhand
- e) Topo sheet No.: 73 B/10
- f) Latitude: 22°33'05" N
- g) Longitude: 84°30'26" E

#### 3.2 Access to site

The access to Thethaitangar SHP site is as follows.

Route		Direction of Destination from Origin	Approach	Distance (approx)
Origin	Destination			
Ranchi (State Capital)	Simdega (District HQ)	South western	National Highway	110 km
Simdega	<b>Tapudega Pandripani</b>	South	National Highway 23 to Birmiltrapur (Orissa)	7.5 km
Raurkela (Rly Stn)	Birmiltrapur (Rly Stn)	North eastern	South Eastern Railway Raurkela Birmiltrapur Branch	26 km
Birmiltrapur (Rly Stn)	<b>Tapudega Pandripani</b>	West northern	National Highway 23 to Simdega	26 km
<b>Tapudega Pandripani</b>	<b>Thethaitangar SHP site</b>	West	Kuchha road	0.5 km

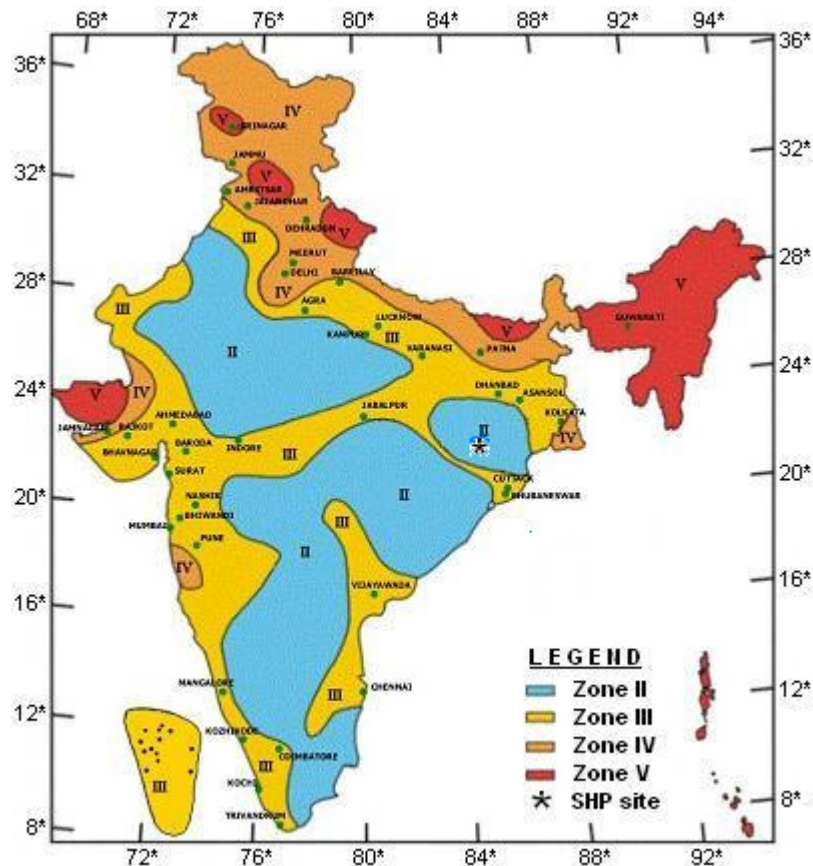
The nearest airport is at Ranchi.

### 3.3 Electrification status of nearby villages

The villages on the west of SHP site, presently, do not have access to electrical power.

### 3.4 Geology & Seismicity

The site is located in Chotanagpur plateau, which is composed mainly of Archaic Gneiss and Granite rocks. The rocks are very old, hard and stable. Jharkhand has no moderate to large earthquakes in recent past, only small tremors have occurred in the region. According to the seismic hazard map of India updated by the Bureau of Indian Standards (BIS) in 2000, all of the southern districts of Jharkhand lie in Zone II.





# Thethaitangar Small Hydro Power Project

## Preliminary Feasibility Report



### 4.0 HYDROLOGY

#### 4.1 Stream / river

The Thethaitangar SHP will utilize the water from Thethaitangar Nadi near village Tengtoli.

- a) Stream / river: Thethaitangar Nadi
- b) Source: Rain fed
- c) Catchment area: 135 sq km (approx)
- d) River basin: Sankh

#### 4.2 Rainfall

The monthly rainfall (mm) of Block Thethaitangar is given in the table below.

**Monthly Rainfall (mm) of Block Thethaitangar**

Month	2000	2001	2002	2003
January	7.8	5.0	0.0	6.6
February	8.6	15.9	31.6	9.5
March	10.7	54.3	50.2	12.2
April	3.8	18.0	10.7	5.0
May	16.8	25.7	4.9	21.7
June	209.7	264.1	148.8	267.9
July	141.0	456.9	183.7	343.2
August	253.1	190.9	206.5	232.5
September	238.3	91.0	266.2	243.2
October	46.5	65.4	267.6	132.2
November	0.0	0.5	3.7	19.4
December	0.6	0.0	7.2	9.0
<b>Total</b>	<b>936.9</b>	<b>1187.7</b>	<b>1181.1</b>	<b>1302.4</b>



# Thethaitangar Small Hydro Power Project

## Preliminary Feasibility Report



### 4.3 Flow

The Thethaitangar SHP site was visited during the 3<sup>rd</sup> week of October 2004, and the flow of Thethaitangar Nadi near village Tengtartoli was measured as 2.965 m<sup>3</sup>/s. As understood from local people and seen from the rainfall data, the river is perennial, though there is lean flow only during summer season.

The flow data of Thethaitangar Nadi near village Tengtartoli is not available. However, the following two bases are available to estimate the flow-duration.

- Mean flow with catchment area of some streams in the Sankh river basin
- Model of flow-duration, based on data of 22 streams scattered over Chhotanagpur plateau area in Jharkhand.

The flow-duration of Thethaitangar Nadi near village Tengtartoli has been estimated on above two bases and shown in the table below.

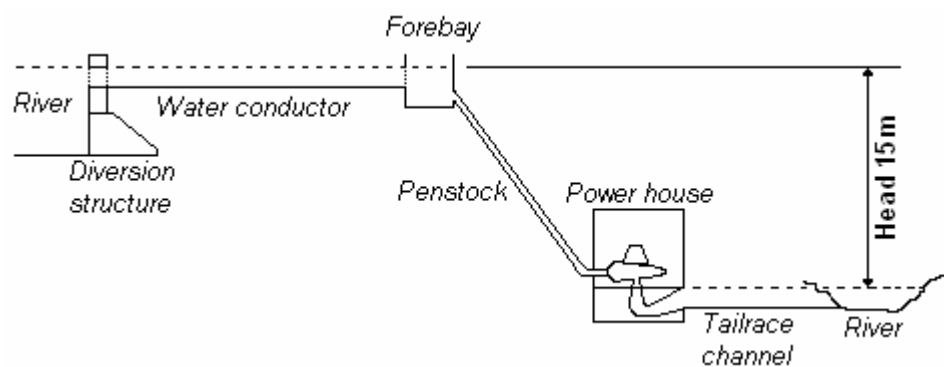
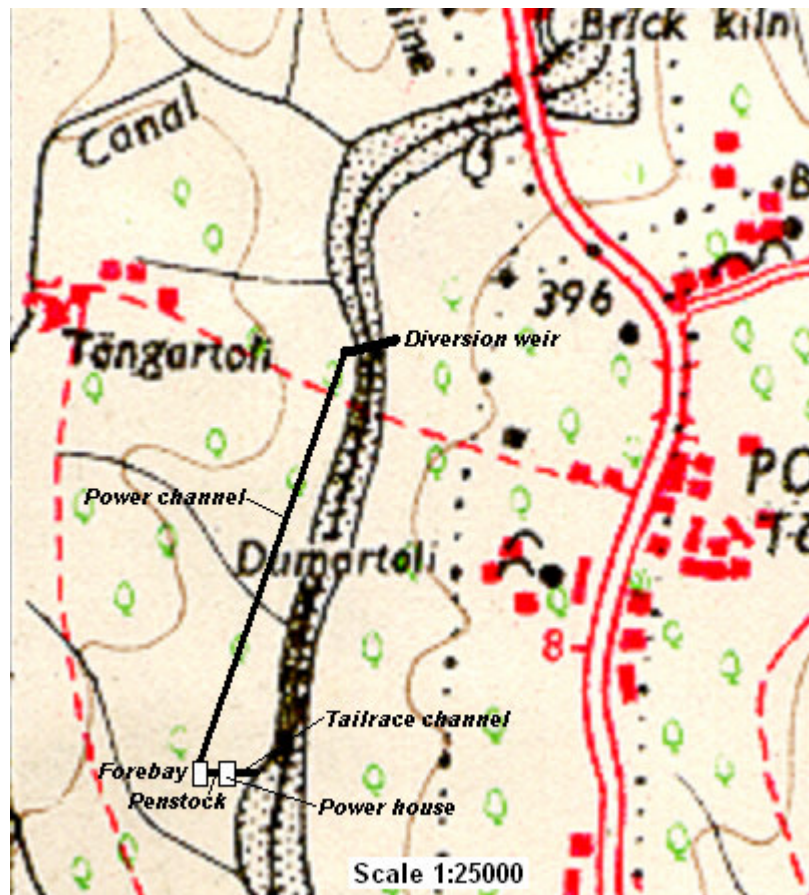
**Flow-duration of Thethaitangar Nadi near village Tengtartoli**

Exceedence Time (%)	Flow (m <sup>3</sup> /s)
25	3.071
50	1.129
60	0.822
75	0.511
80	0.429
90	0.281

It has found that the flow measured (2.965 m<sup>3</sup>/s) lies between the flow of exceedence times 25% and 50%, which indicates the correctness of flow-duration.

### 5.0 PRELIMINARY LAYOUT

The preliminary layout is outlined below in the relevant portion of the Toposheet. During the site visit the head was measured as 15m and is indicated in the schematic sketch.



**Schematic sketch**



# Thethaitangar Small Hydro Power Project

## Preliminary Feasibility Report



### 6.0 POWER POTENTIAL

#### 6.1 Power

The flow for different exceedence times is given in column (2) of the table below. The net head is worked out as 14.25m, assuming the head loss of 5%, and is shown in column (3). Assuming the overall plant efficiency of 85%, the power potential is worked out and shown in column (4) of the following table.

(1)	(2)	(3)	(4)
% Exceedence Time	Flow (cumec)	Net Head (m)	Power Potential (kW)
25	3.071	14.25	365
50	1.129	14.25	134
60	0.822	14.25	98
75	0.511	14.25	61
80	0.429	14.25	51
90	0.281	14.25	33

#### 6.2 Conclusion

The SHP site preliminarily seems to have small potential, but seeing the nature of rainfall and availability of water in the river almost through out the year, with a little storage the power potential can be increased. Also exact availability of water for power generation over different periods of a year will be measured during Detailed Survey and Investigation (DSI).

Further in view of non-availability of electrical power to villages nearby the site, whatever potential is available, is needed to be harnessed.

Therefore, it is recommended to carry out the next stage of development of The SHP, namely; Detailed Survey and Investigation (DSI).