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.

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

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.

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.

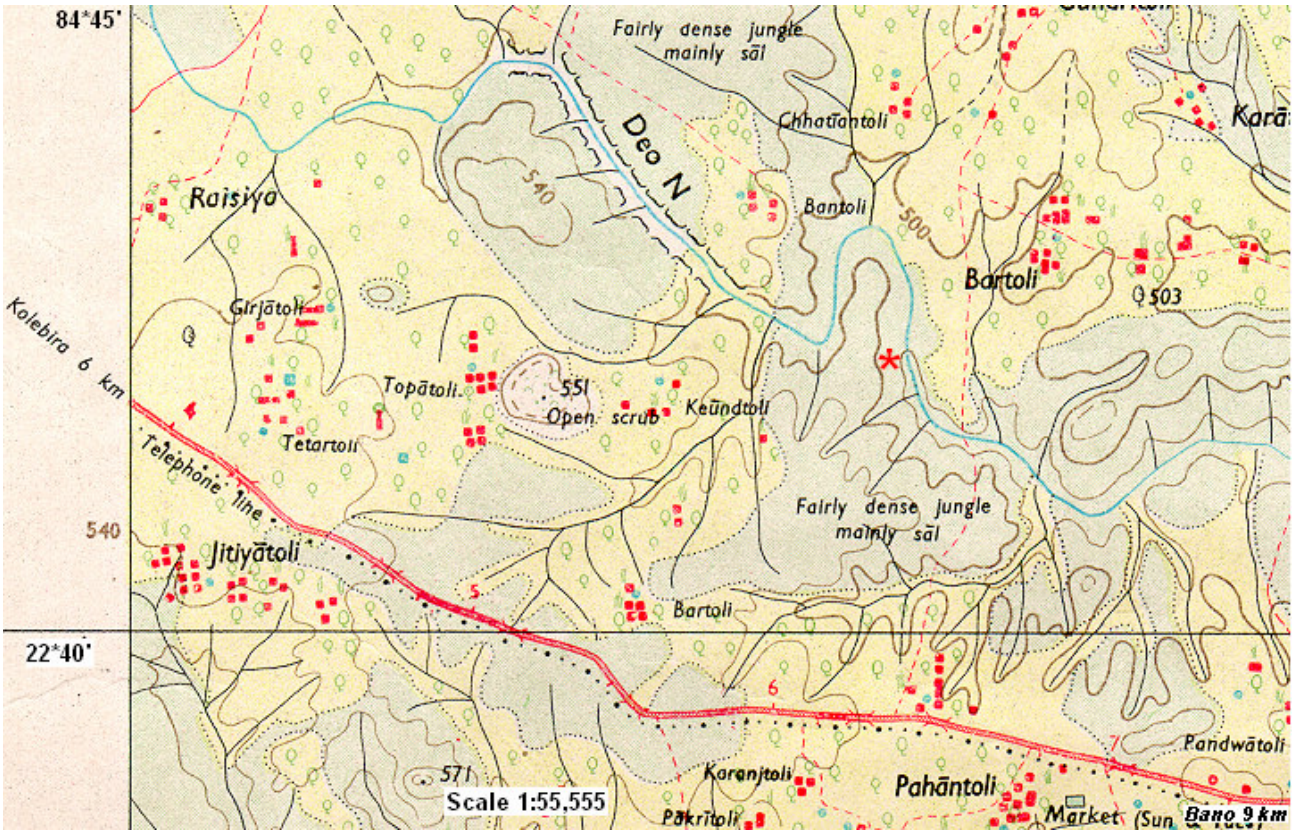
1.4 Scope of report

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


N
BIHAR
J H A R K H A N D
RANCHI
WEST BENGAL
CHHATTISGARH
KEUNDTOLI
KOLEBIRA
#BANO
SIMDEGA
ORISSA
State Capital
District HQ
Block HQ
Village
SHP Site
Rly Stn


84°45'
22°40'
Fairly dense jungle mainly sāl
Deo N
Chhatiantoli
Karā
Raisiyo
540
Bantoli
500
Bartoli
503
Girjātoli
Kolebira 6 km
Topātoli
551
Open scrub
Keūndtoli
Tetartoli
Telephone line
Fairly dense jungle mainly sāl
Jitiyātoli
Bartoli
Pandwātoli
571
Karanjtoli
Pahāntoli
Pakritoli
Market
Bano 9 km
Scale 1:55,555

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: Keundtoli

b) Block: Kolebira

c) District: Simdega

d) State: Jharkhand

e) Topo sheet No.: 73 B/14

f) Latitude: 22°40'42" N

g) Longitude: 84°47'05" E

3.2 Access to site

The access to Kolebira SHP site is as follows.

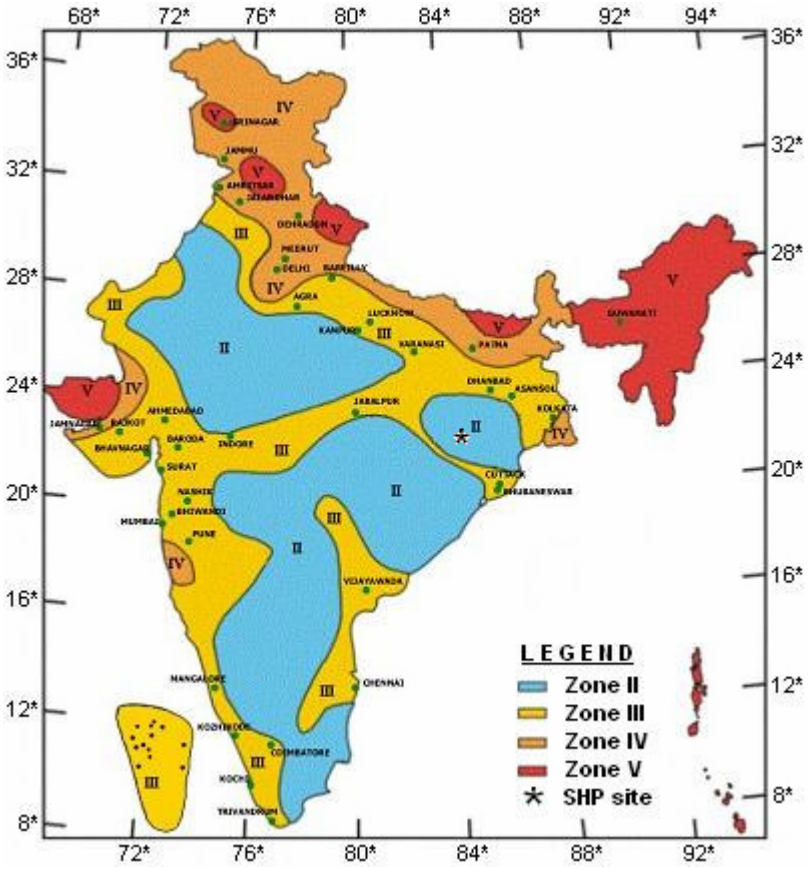
Route		Direction of Destination from Origin	Approach	Distance (approx)
Origin	**Destination**			
Ranchi (State Capital)	Kolebira (Block HQ)	South western	State Highway	83 km
Simdega (District HQ)		East	National Highway 23	30 km
Kolebira	***Jitiyatoli*** (village)	East	Metalled road to Bano	7.5 km
Ranchi (Rly Stn)	Hatia (Rly Stn)	South	South Eastern Railway	5 km
Hatia (Rly Stn)	Bano (Rly Stn)	South western	South Eastern Railway Bandamunda Hatia Branch	100 km
Bano (Rly Stn)	Bano (Town)	South eastern	Unmetalled road	2.5 km
Bano	***Jitiyatoli*** (village)	West	Metalled road to Kolebira	11 km
Jitiyatoli	Keundtoli (village)	East	Kuchha road	2.5 km
Keundtoli	**Kolebira SHP site**	East	Fairly dense jungle mainly sal	1 km

3.3 Electrification status of nearby villages

There are about 25 villages within a radius of 5 km from the SHP site, having a total about 1250 houses. Presently these villages 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.



4.0 HYDROLOGY

4.1 River / Stream

The Kolebira SHP will utilize the water from Deo Nadi near village Keundtoli.

a) Stream / river: Deo Nadi

b) Source: Rain fed

c) Catchment area: 70 sq km (approx)

d) River basin: South Koel

4.2 Rainfall

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

Monthly Rainfall (mm) of Kolebira

Month	2000	2001	2002	2003
January	61.0	50.1	12.0	6.0
February	20.2	15.4	12.0	6.0
March	48.4	29.5	15.3	15.0
April	24.0	10.5	35.0	14.0
May	21.0	91.0	175.2	15.0
June	125.6	238.6	177.2	228.0
July	244.6	401.0	300.5	140.0
August	293.5	371.7	248.3	248.5
September	588.0	207.6	254.1	363.0
October	106.8	126.0	0.8	94.0
November	12.0	5.0	10.7	10.0
December	0.0	0.0	5.8	4.0
Total	**1545.1**	**1546.4**	**1246.9**	**1143.5**

4.3 Flow

The Kolebira SHP site was visited during the 3rd week of October 2004, and the flow of Deo Nadi near village Keundtoli was measured as 0.38 m^3/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 Deo Nadi near village Keundtoli is not available. However, the following two bases are available to estimate the flow-duration.

a) Mean flow with catchment area of some streams in the South Koel river basin
b) Model of flow-duration, based on data of 22 streams scattered over Chhotanagpur plateau area in Jharkhand

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

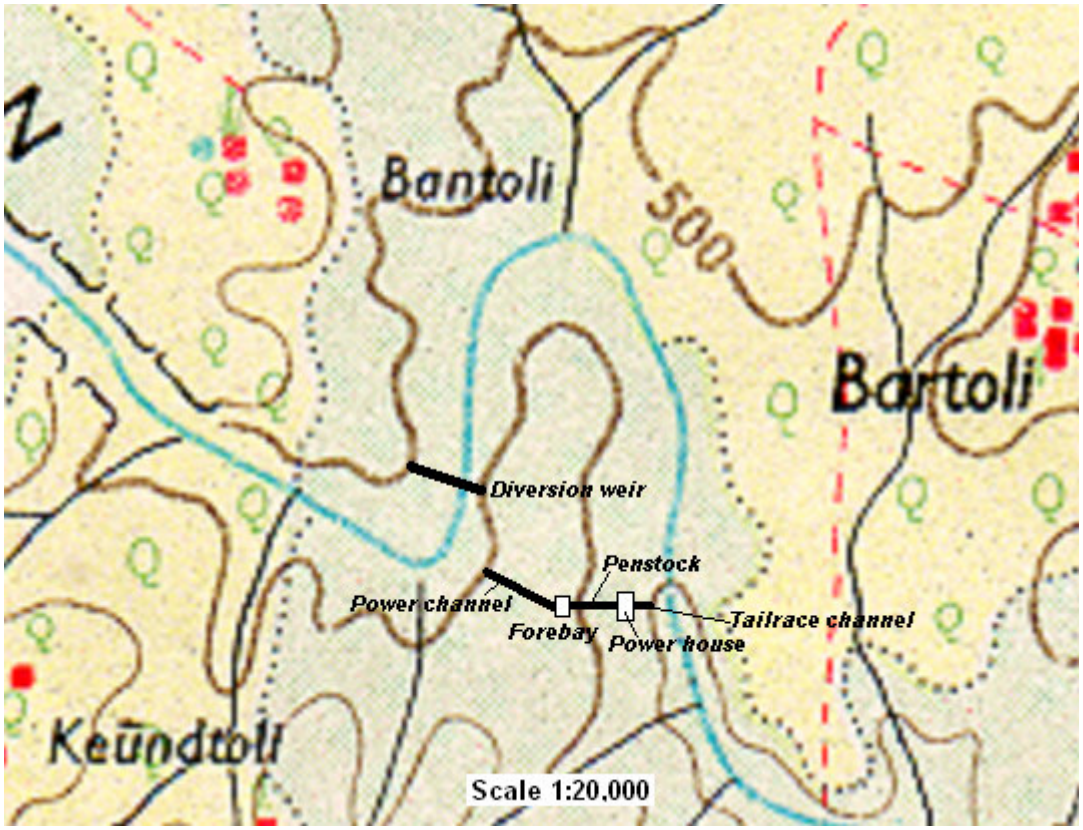
Flow-duration of Deo Nadi near village Keundtoli

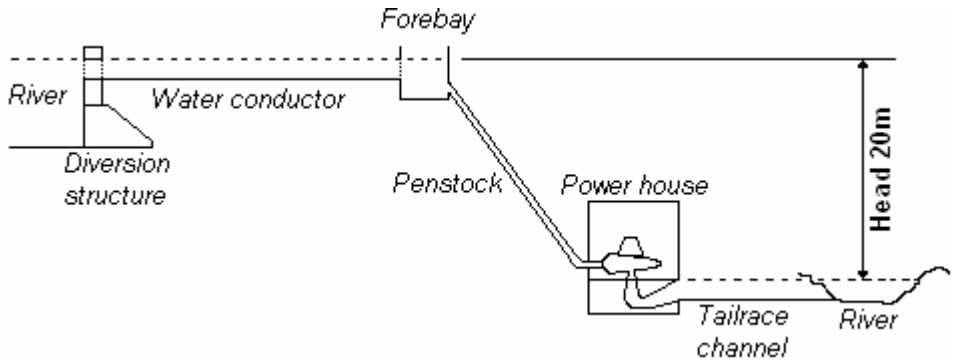
Exceedence Time (%)	Flow (m^3/s)
25	1.018
50	0.374
60	0.273
75	0.169
80	0.142
90	0.093

It has found that the flow measured (0.38 m^3/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 20m and is indicated in the schematic sketch.





Schematic sketch

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 19m, 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	1.018	19	161
50	0.374	19	59
60	0.273	19	43
75	0.169	19	27
80	0.142	19	22
90	0.093	19	15

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).