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.

Chainpur SHP site is one of 22 SHP sites, located in the western part of Jharkhand. It is situated in the Block Chainpur of District Gumla. The Chainpur SHP is proposed to utilize the flow of Sankh river near village Bukma.

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.

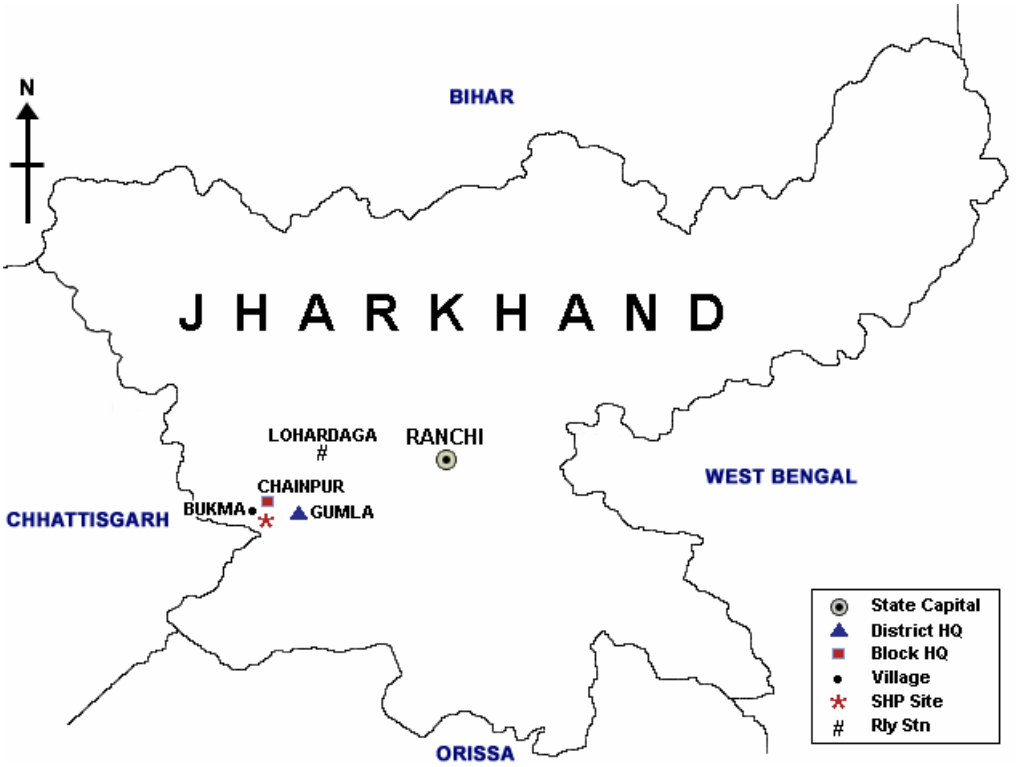
The aim of the report is to examine the adequacy for proceeding to the next stage of work; Detailed Survey & Investigation.

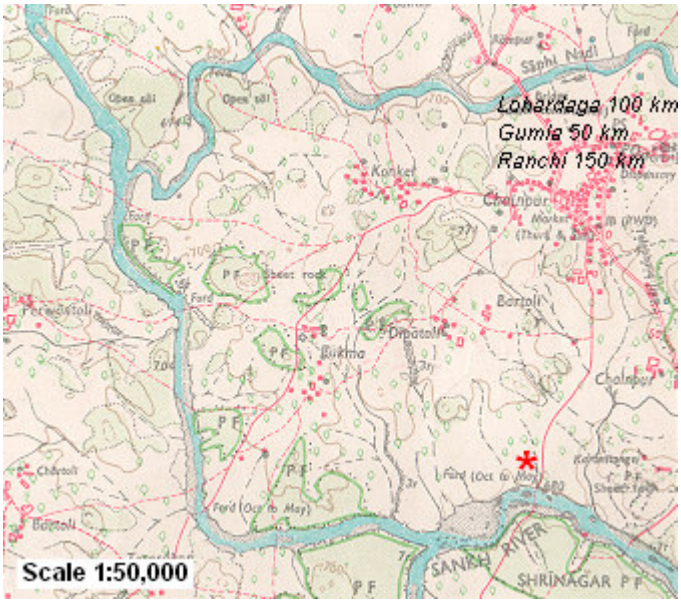
1.4 Scope of report

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
LOHARDAGA
#
RANCHI
CHAINPUR
BUKMA
GUMLA
CHHATTISGARH
WEST BENGAL
ORISSA
State Capital
District HQ
Block HQ
Village
SHP Site
Rly Stn


Lohardaga 100 km
Gumla 50 km
Ranchi 150 km
Scale 1:50,000
SANKH RIVER
SHRIMAGAR

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: Bukma
b) Block: Chainpur
c) District: Gumla
d) State: Jharkhand
e) Topo sheet No.: 73 A/4
f) Latitude: 23°06'37" N
g) Longitude: 84°14'22" E

3.2 Access to site

The access to Chainpur SHP site from Chainpur is highlighted in the Index Map. The access to Chainpur from the State capital, District HQ and the nearest Railway Station are as follows.

Place		Type of approach	Distance (approx)
Origin	Destination		
Ranchi (State Capital)	Gumla (District HQ)	National Highway (NH 23)	100 km
Lohardaga (Nearest Rly Stn)	Gumla	State Highway	50 km
Gumla	Chainpur (Block HQ)	State Highway	50 km

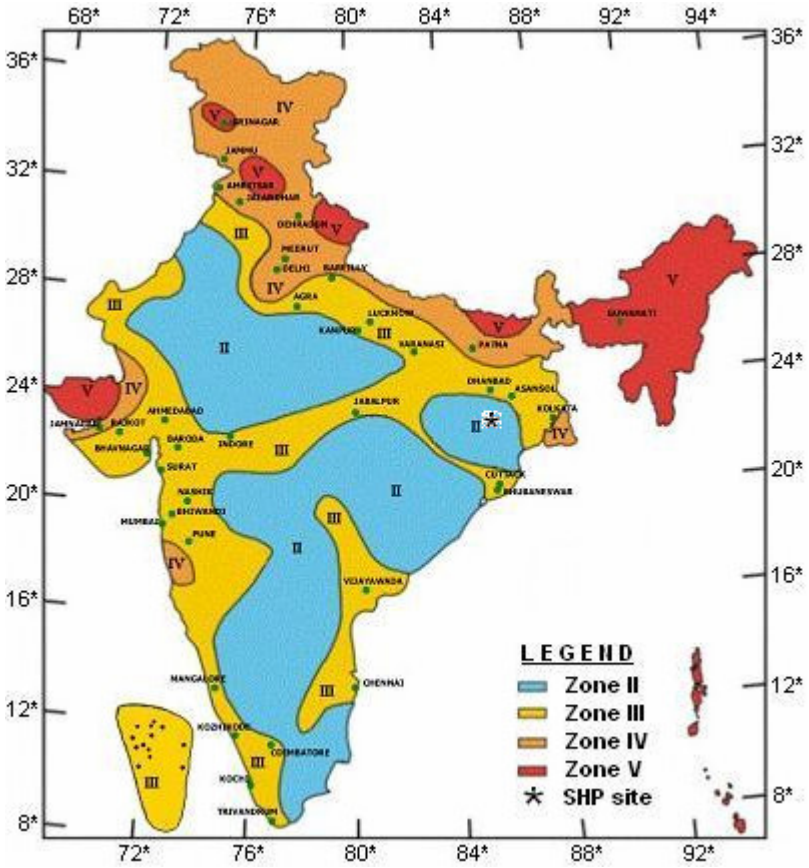
The nearest railway station Lohardaga is in Ranchi Lohardaga section of South Eastern Railway. The nearest airport is at Ranchi.

3.3 Electrification status of nearby villages

There are about 8 villages having about 300 houses nearby the SHP site, which do not have access to electrical power. Electrical power is available in Chainpur, which is about 2 km away from the SHP site.

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 Chainpur SHP will utilize the water from Sankh river near village Bukma.

a) Stream / river: Sankh Nadi

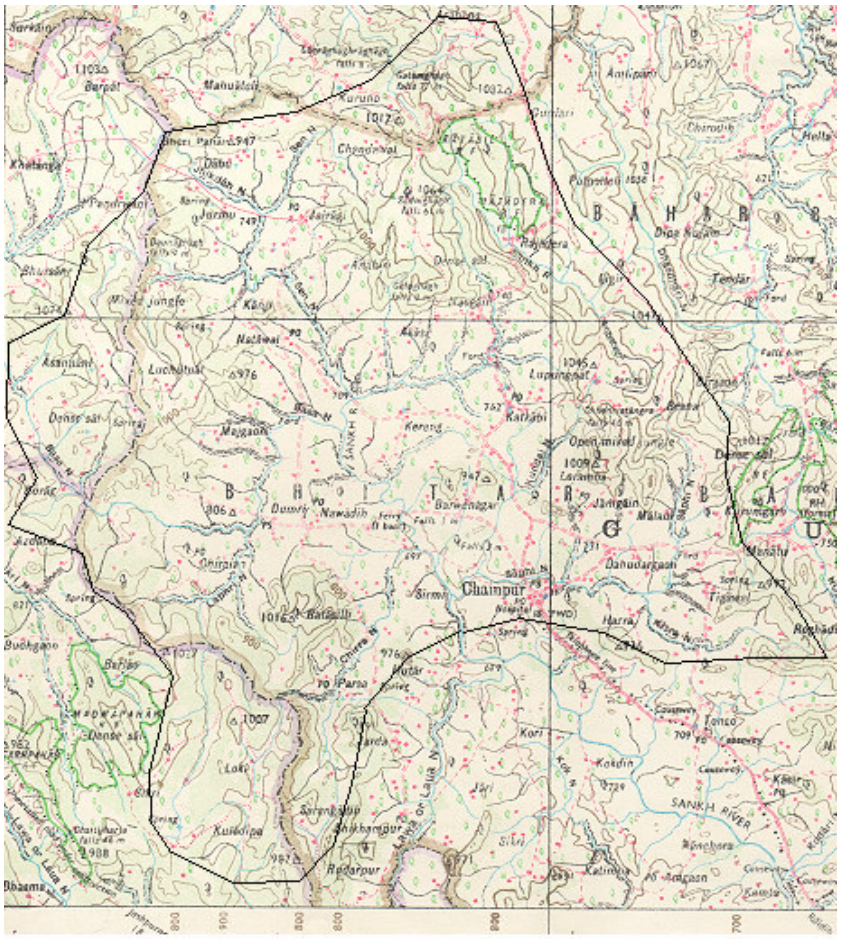
b) Source: Rain fed

c) Catchment area: 1100 sq km (approx)

d) River basin: Sankh river

4.2 Catchment area

The catchment area is delineated on the topo sheet as shown below.



4.3 Rainfall

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

Monthly Rainfall (mm) of Chainpur

Month	2000	2001	2002	2003
January	0	0	3	4
February	3	12	2	5
March	4	10	5	0
April	4	11	0	7
May	3	0	2	0
June	77	88	338	373
July	557	349	346	368
August	356	368	316	281
September	319	310	272	268
October	35	35	37	35
November	45	42	40	41
December	21	0	0	23
Total	**1424**	**1225**	**1361**	**1404**

4.4 Flow

The Chainpur SHP site was visited during the 4th week of November 2004, and the flow of Sankh river near village Bukma was measured as 4.59 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 Sankh river near village Bukma are not available. However, the following two bases are available to estimate the flow-duration.

a) Mean flow with catchment area of 22 streams scattered over Chhotanagpur plateau area in Jharkhand.
b) Model of flow-duration, based on data of 22 streams scattered over Chhotanagpur plateau area in Jharkhand.

The flow-duration of Sankh river near village Bukma has been estimated on above two bases and shown in the table below.

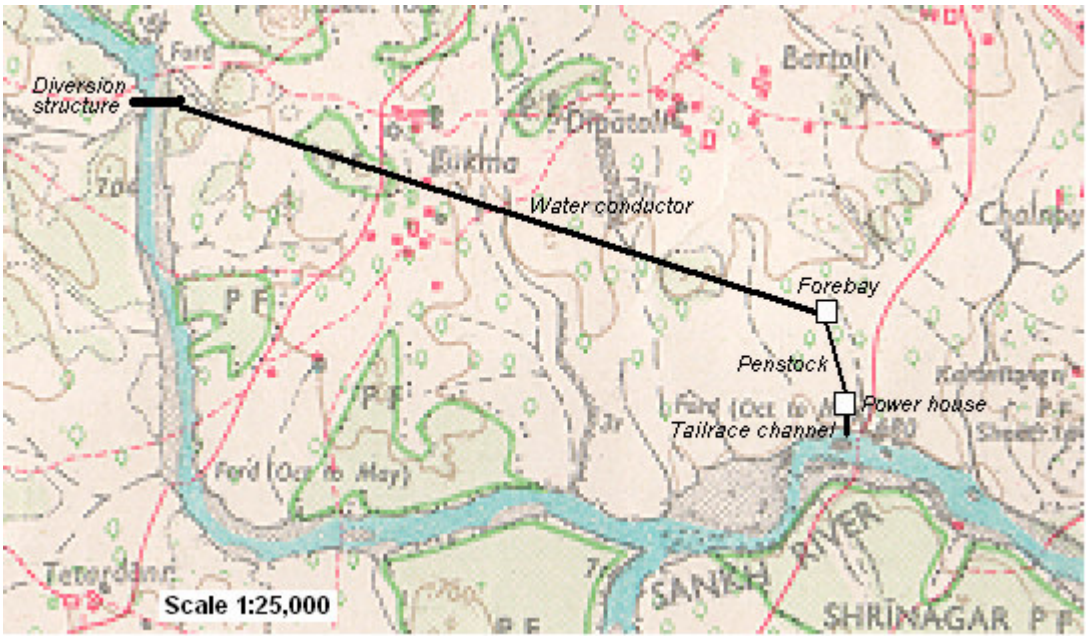
Flow-duration of Sankh Nadi near village Bukma

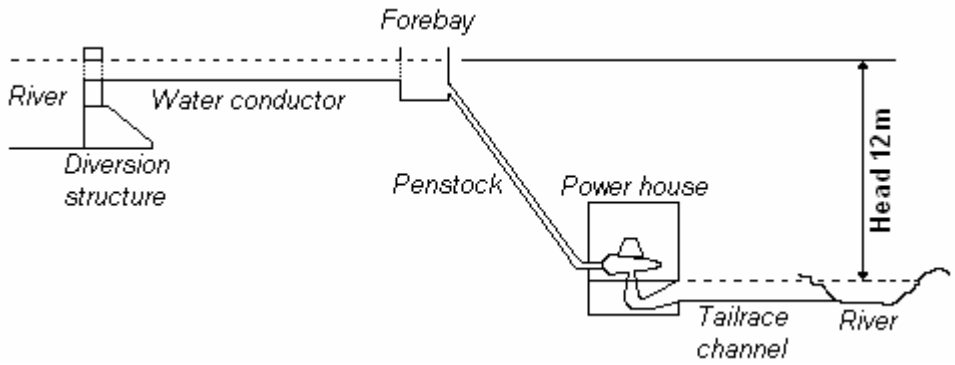
Exceedence Time (%)	Flow (m^3/s)
25	12.513
50	4.600
60	3.350
75	2.080
80	1.749
90	1.145

It has found that the flow measured (4.59 m^3/s) is close to the flow of exceedence time 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 12m 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 11.4m, 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	12.513	11.4	1189
50	4.600	11.4	437
60	3.350	11.4	318
75	2.080	11.4	198
80	1.749	11.4	166
90	1.145	11.4	109

6.2 Conclusion

The SHP site preliminarily seems to have good potential. Besides, supplying power to nearby 8 villages, it will strengthen the local electrical grid. The project will go a long way in developing socio-economic condition of the people. 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).

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