
	<h1 style="text-align: center;">Pinrhe Small Hydro Power Project</h1> <h2 style="text-align: center;">Preliminary Feasibility Report</h2>	
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## 1.0 INTRODUCTION

### 1.1 General

The state of Jharkhand almost comprises hilly terrain mostly of Chhotanagpur plateau and 29% 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.

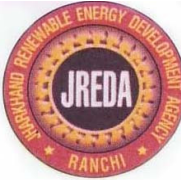

About 55% of villages in the Jharkhand are yet to see electrical power. It is prudential to harness the SHP potential sites for the electrification of its nearby villages.

Jharkhand Renewable Energy Development Agency (JREDA) has entrusted MECON LIMITED for preparation of Preliminary Feasibility Report (PFR) for one of the sites located near Pinrhe in Palamu District in Jharkhand.

Pinrhe SHP site is located in the western part of Jharkhand. North Koel river is the border between Chainpur Block (of Palamu Distt.) and Barwadih Block (of Latehar District). The Pinrhe SHP is proposed to utilize the flow and rapid of North Koel river near village Pinrhe or Mangra.

### 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.

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### 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 and for obtaining idea on the access to site.
- b) One-day 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.



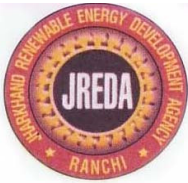
# Pinrhe Small Hydro Power Project

## Preliminary Feasibility Report



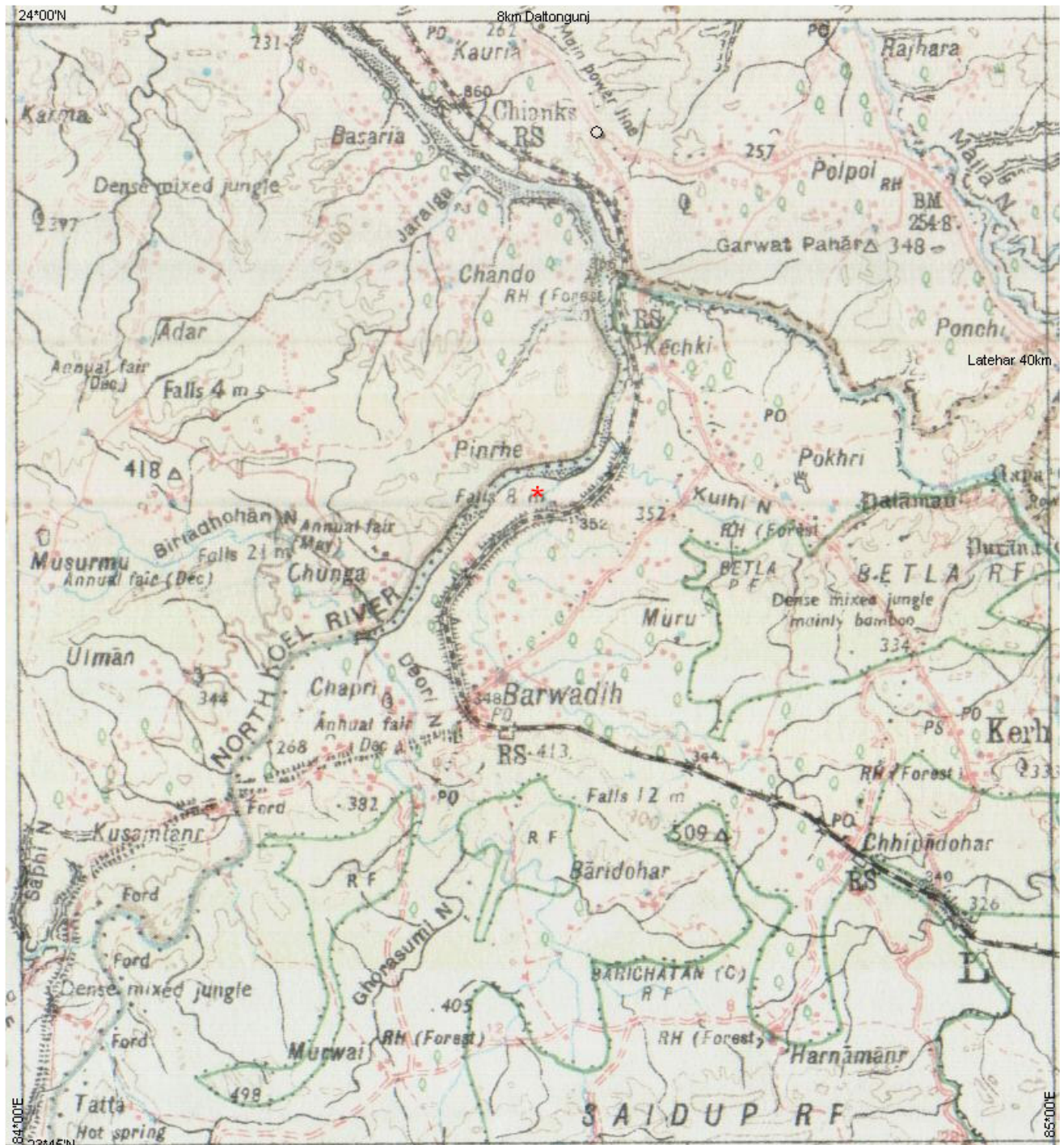
### 2.0 INDEX MAP







# Pinrhe Small Hydro Power Project

## Preliminary Feasibility Report



\* Probable location of Site



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### 3.0 GENERAL INFORMATION

#### 3.1 Location of site

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

	Option-I	Option-II
a) Village:	Pinrhe	Mangra
b) Block:	Chainpur	Barwadih
c) District:	Palamu	Latehar
d) State:	Jharkhand	Jharkhand
e) Topo sheet No.:	73 A/1	73 A/1
f) Latitude:	23°53'13" N	23°53'13" N
g) Longitude:	84°06'54" E	84°06'54" E

#### 3.2 Access to site

The access to Pinrhe SHP site from the from the State capital are as follows.

Place		Type of approach	Distance (approx)
Origin	Destination		
Ranchi (State Capital)	Latehar (District HQ)	National Highway (NH 75)	100 km
Latehar	Conjunction of roads 10 km before Daltonganj (Left turn)	National Highway (NH 75)	50 km
Conjunction of roads	Barwadih (Block HQ and Railway Junction)	State Highway	15 km
Barwadih	SHP Site	Option - I Motorable road  Option-II Motorable road+ Ford	5 km

The nearest Railway Station is at Barwadih about 5 km from the proposed Power House site.

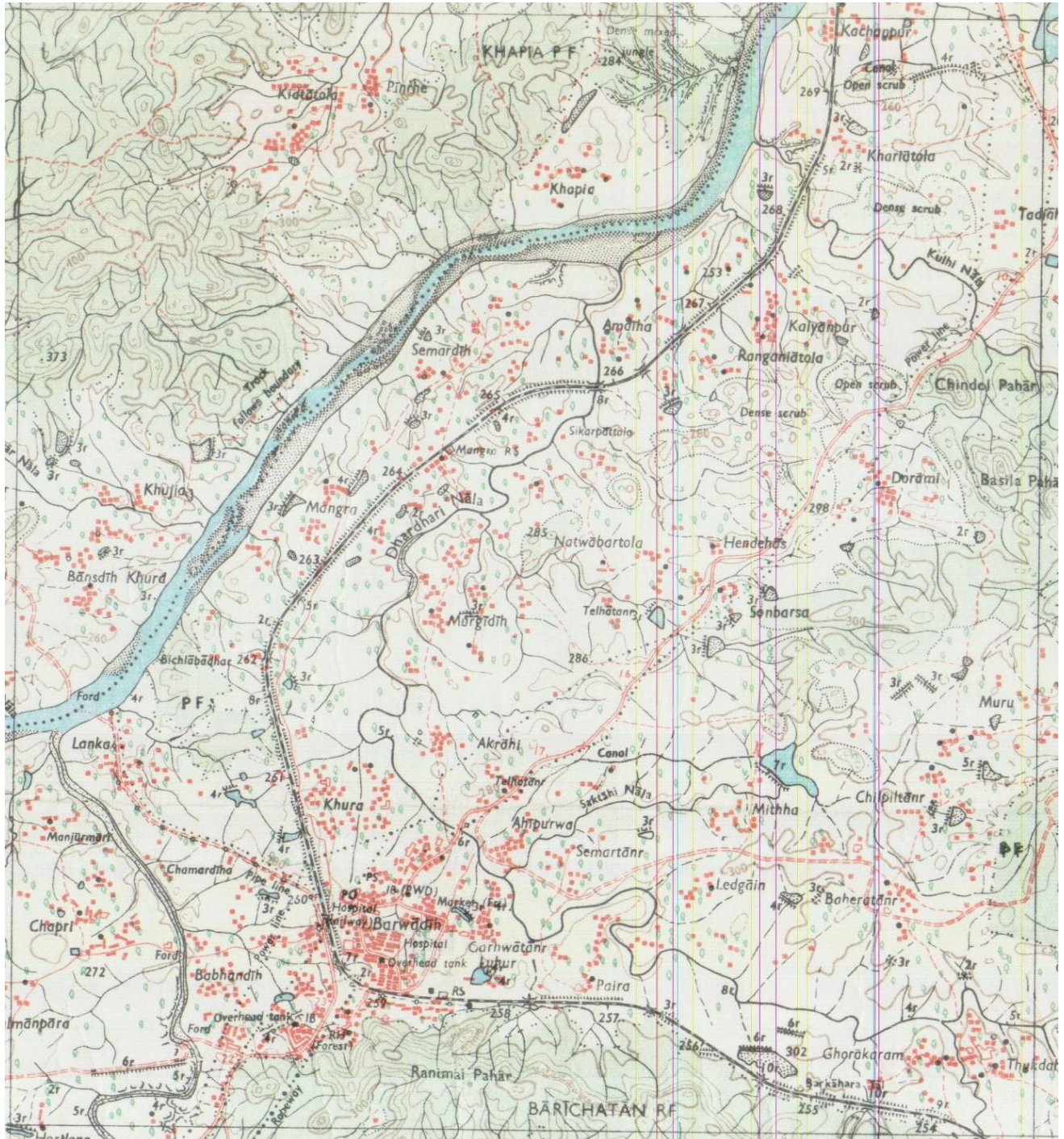
The nearest airport is at Ranchi.

The relevant portion of the Toposheet 73 A/1 near the SHP site is produced below.



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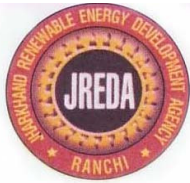
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### 3.3 Electrification status of nearby villages

There are a number of villages in the vicinity of the SHP site on both sides of the North Koel river namely Pinrhe, Bansdih Khur, Bairly, Mangra, Semardih, Amdih etc. These villages





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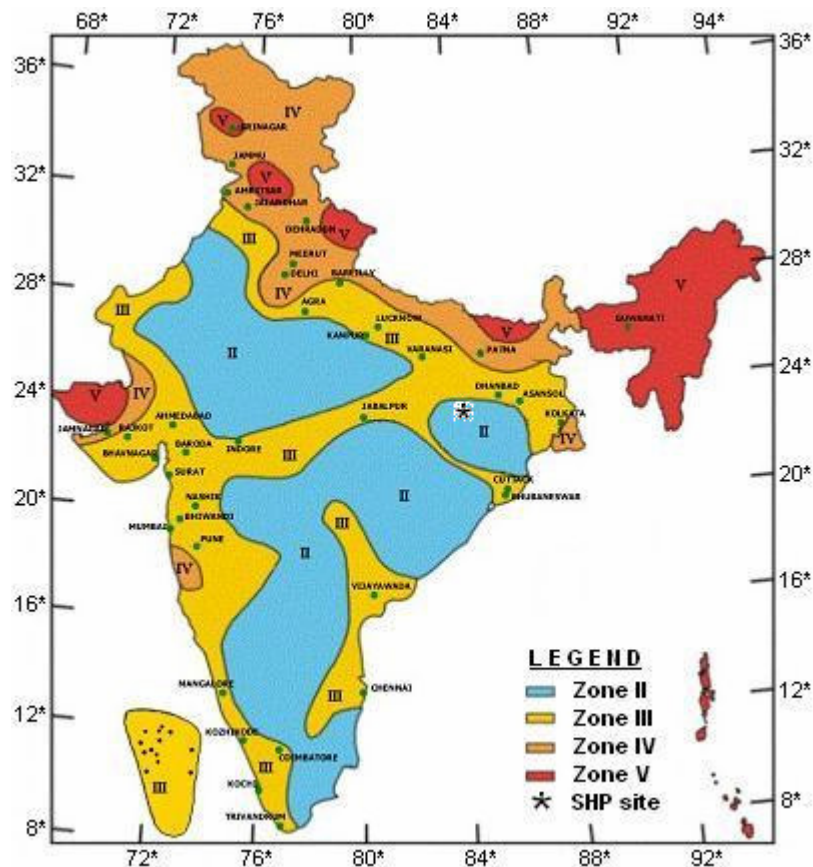




presently do not have access to electrical power. Further there is a 33/11kV substation near Barwadih which is about 5 km from the proposed power house site having 2x1600kVA transformers. There is space for providing a new bay at the Substation.

Though the villages in Barwadih block near SHP site can avail power from the Barwadih substation. For electrifying the villages in the Chainpur Block near SHP site from Barwadih Substation will require the transmission line to cross the river .

### 3.4 Geology & Seismicity

The geology of site is composed mainly of Carbonaceous Quartzite. 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, almost all of Jharkhand lie in Zone II.



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## HYDROLOGY

### 3.5 River / Stream

The Pinrhe SHP will utilize the water from river North Koel on the upstream of a rapid near village Mangra.

- a) Stream / river: North Koel
- b) Source: Rain fed
- c) River basin: Sone

### 3.6 Rainfall

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

**Monthly Rainfall (mm) of Barwadih**

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
<b>2005</b>	-	-	0	0	1.2	44.1	94.8	139.2	61.5	12.4	0	1
<b>2006</b>	0	0	0	0	6	124.7	179.3	129.9	32.1*			

\* up to 15<sup>th</sup> Sept.



### 3.7 Flow

On the North Koel river about 30 km upstream of the proposed Pinrhe SHP site, Kutku Dam has been constructed. Kutku dam is expected to release water in a regulated manner.

As understood from the Project Report of North Koel Hydroelectric Project on Kutku Dam, the following regulated flow is expected to be released from Kutku Dam.

Month	Assured available Release from Kutku Dam Reservoir		Release (cumec) in descending order	Corresponding month	Exceedence Time (%)
	cusec	cumec			
(1)	(2)	(3)	(4)	(5)	(6)
Jan	943	26.70	121.71	Oct	8.5
Feb	1726	48.87	48.87	Feb	16.0
Mar	953	26.99	47.57	Sep	25.0
Apr	100	2.83	26.99	Mar	33.0
May	100	2.83	26.70	Jan	41.5
Jun	100	2.83	21.32	Dec	50.0
Jul	250	7.08	18.35	Nov	58.0
Aug	250	7.08	7.08	Jul	66.5



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<b>Sep</b>	<b>1680</b>	47.57	7.08	<b>Aug</b>	75.0
<b>Oct</b>	<b>4298</b>	121.71	2.83	<b>Apr</b>	83.3
<b>Nov</b>	<b>648</b>	18.35	2.83	<b>May</b>	92.0
<b>Dec</b>	<b>753</b>	21.32	2.83	<b>Jun</b>	100.0

Further, the catchment area of river North Koel in the stretch between Kutku dam & Pinrhe SHP is about 300 sq.km. For this catchment area, the flow-duration of North Koel near Pinrhe SHP has been estimated as follows.

**Flow-duration of North Koel river near Pinrhe SHP for Catchment area 300 sq.km**

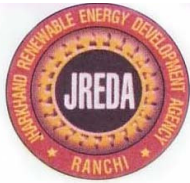
<b>Exceedence Time (%)</b>	<b>Flow (m<sup>3</sup>/s)</b>
25	3.43
50	1.26
60	0.92
75	0.57
80	0.48
90	0.31

So, the total estimated flow available for Pinrhe SHP is expected to be as follows.

<b>Exceedence Time (%)</b>	<b>Discharge from Kutku (m<sup>3</sup>/s)</b>	<b>Expected flow from intermediate catchment</b>	<b>Total</b>
25	47.57	3.43	51.00
50	21.32	1.26	22.58
75	7.08	0.57	7.65
90	2.83	0.31	3.14

Note: The flow arrived at is an estimation, however the actual flow is expected to be higher. The flow need to be measured for two lean seasons during DSI preparation.

The Pinrhe SHP site was visited during the 2<sup>nd</sup> week of September 2006, and the flow of North Koel near village Pinrhe / Mangra was measured as 100 m<sup>3</sup>/s. This is higher than the estimated but taking in to account that there are lot of spill during September the flow measured seems to be in line.



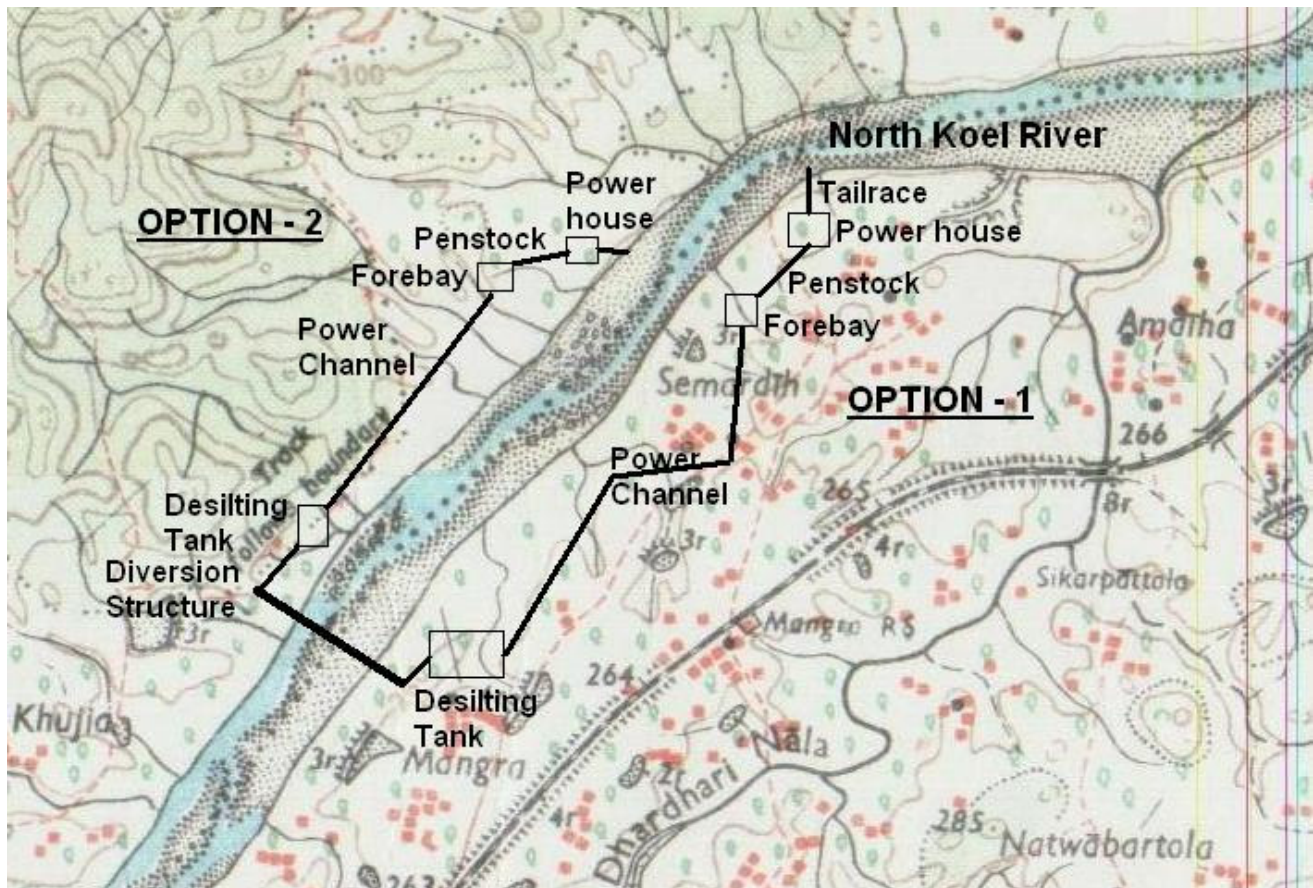
# Pinrhe Small Hydro Power Project

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### 5.0 PRELIMINARY LAYOUT

The project can have two options of layout as indicated in Toposheet. This needs to be investigated during detailed survey & investigation.





#### Option-I:

In option I for supply of electricity to the villages near SHP in Chainpur block will require the transmission line to be laid across the North Koel river. However the land required to be acquired are expected to be mostly private/govt. land.

#### Option-II:

In option II, electricity can be directly supplied to villages near SHP in Chainpur block but for supply of surplus power to the grid will require the transmission line to be laid across the North Koel river. However the land required to be acquired are expected to be mostly govt. land and also some land of protected forest area.

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## 4.0 POWER POTENTIAL

### 4.1 Power

The flow for different exceedence times is given in column (2) of the table below. The net head is worked out as 14 m, 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 (MW)
25	51.00	14	6.00
50	22.58	14	2.60
75	7.65	14	0.90
90	3.14	14	0.37

### 4.2 Conclusion

Pinrhe SHP site has a very good potential. Besides, supplying power to nearby villages, it will strengthen the electrical grid. The project will go a long way in developing socio-economic condition of the people.

Preliminarily the project seems feasible and is recommended for carrying out Detailed Survey and Investigation.





# **Pinrhe Small Hydro Power Project**

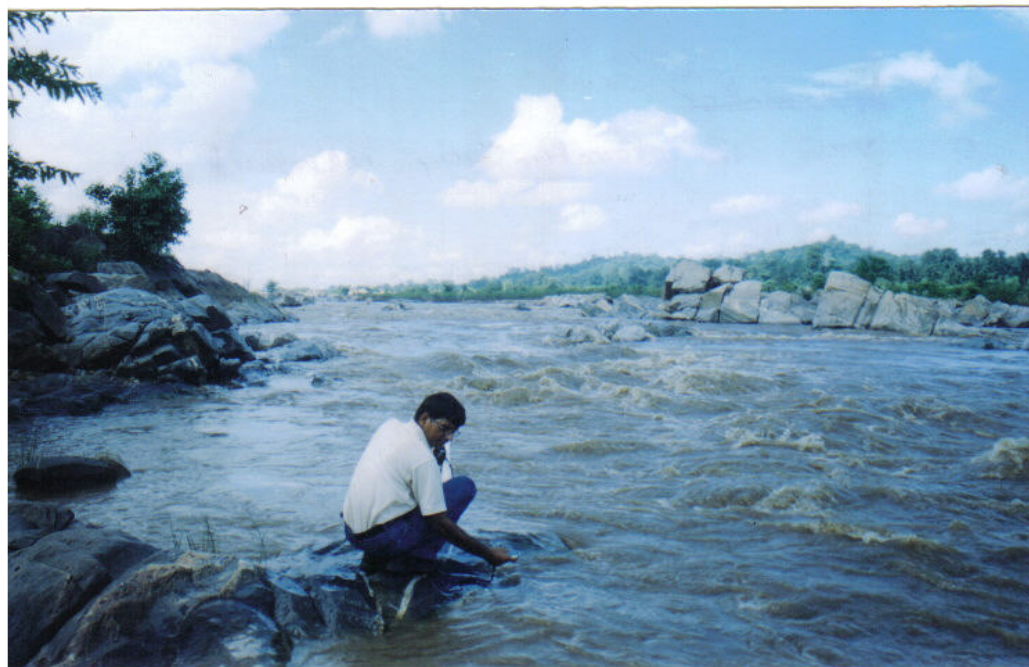
## **Preliminary Feasibility Report**



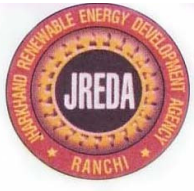
### **PHOTOGRAPHS**



View of North Koel River



View of elevation being measured by altimeter



# **Pinrhe Small Hydro Power Project**

## **Preliminary Feasibility Report**



Probable weir site



Probable Power House Site





# Pinrhe Small Hydro Power Project

## Preliminary Feasibility Report



Nearby Railway Junction (5 Kms away)



Nearby 33/11 kV S/S (approx. 5 km away)