GENERAL INFORMATION

* Location of Site:-

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

a) Village (at power house):- Sita fall
b) Block   :- Angara
c) District   :- Ranchi
d) State   :- Jharkhand
e) Latitude   : -85°35'40" E
f) Longitude   :- 23°22'23" N

• Access to site :-

The access to Johna SHP site from Ranchi is as follows.

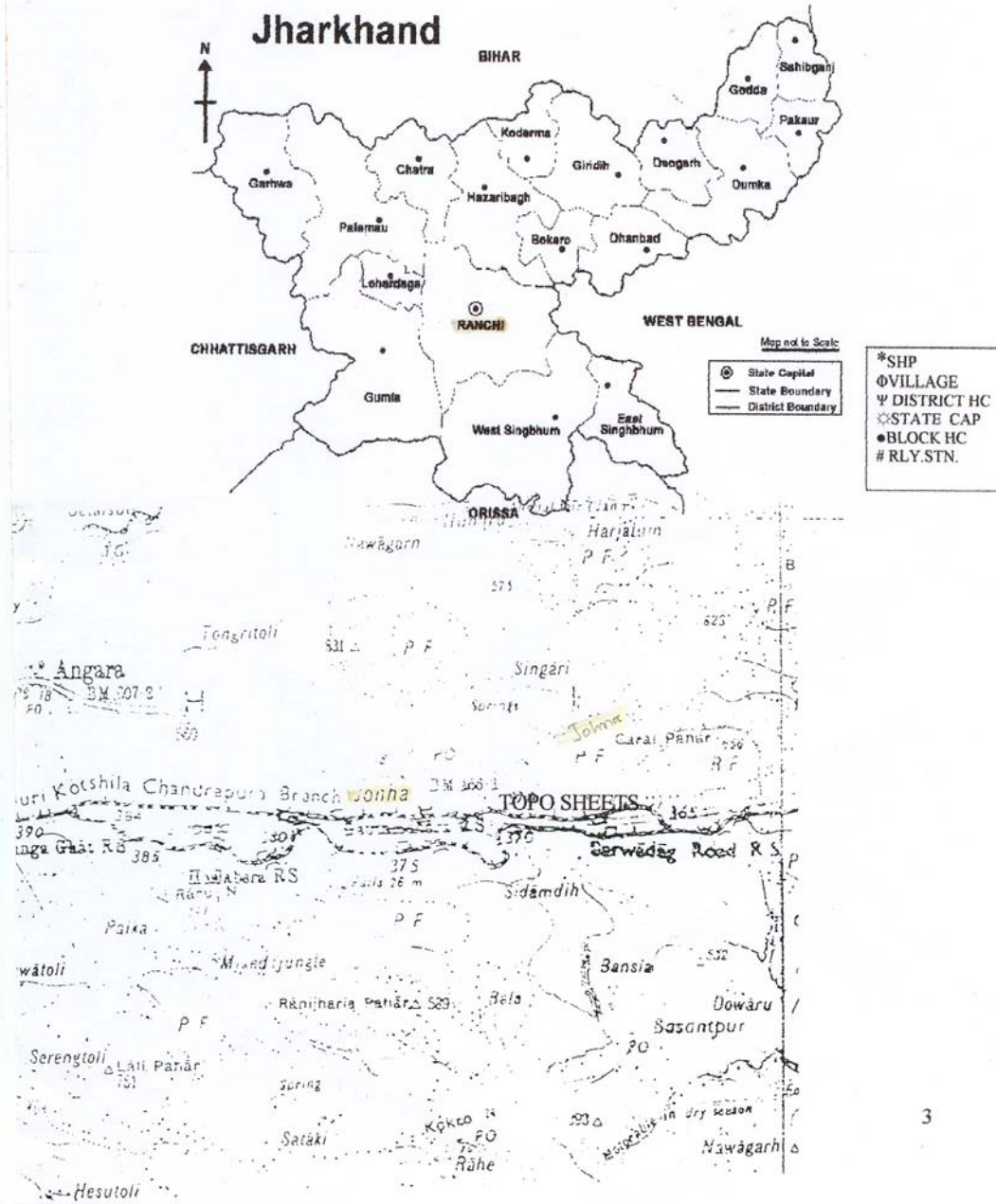| Approch (approx)		Type of rode	Distance
Ranchi	Sita fall	State Highway	16.5 km
Sita fall	Gilingsoreng	State Highway	6 km
Gilingsoreng	...Namkume...............	National Highway...	8 km
Sita fall	Silli	State Highway	5 km

The nearest railway station is at Gautamdhara, which is about 1.5 km away from Gilingsoreng i village. However, the approach to the project site is convenient by road from Ranchi Railway Station, which is 15 km from the project site. The nearest airport is also Ranchi.

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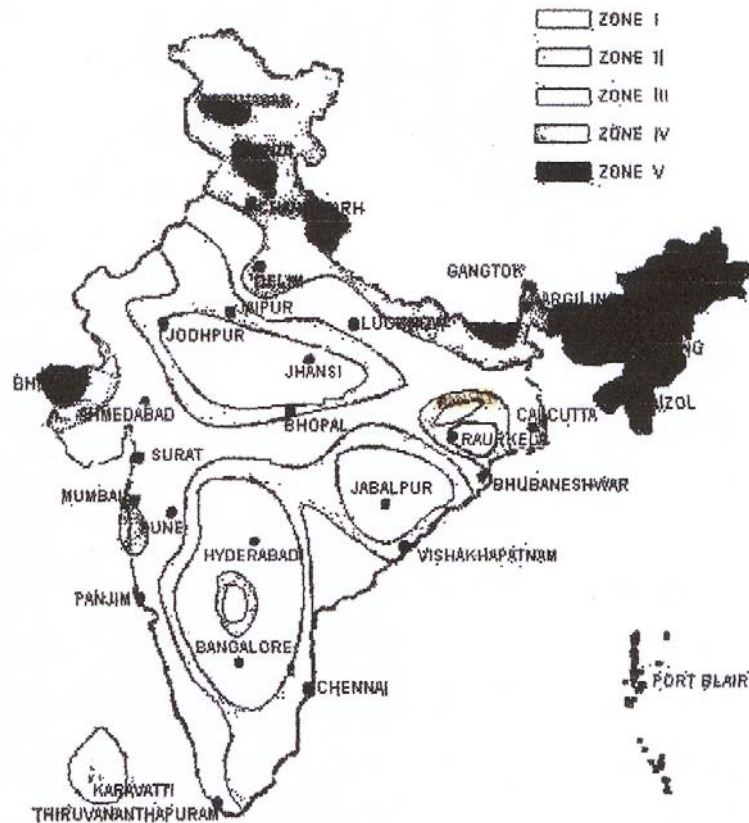
The site is located in Chotanagpur plateau, which is composed mainly of Archaic Gneiss and Granite rocks are very old, hard and stable. Jharkhand has no moderate to large earthquakes in recent past, only small tremors have occurred in the region. According to the seismic hazard map of India updated by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

INDEX MAP

Jharkhand

N

BIHAR

Sahibganj

Godda

Pakaur

Kodarma

Chatra   Giridih   Deogarh

Garhwa   Dumka

Hazaribagh

Palemau

Bokaro   Dhanbad

Lohardaga

RANCHI   WEST BENGAL

CHHATTISGARH

Gumla

West Singbhum   East Singhbhum

ORISSA

Map not to Scale

⊚ State Capital
— State Boundary
— District Boundary

*SHP
ΦVILLAGE
Ψ DISTRICT HC
✩STATE CAP
●BLOCK HC
RLY.STN.

Harjalum

P F.

Nawagarn

575

P F

625

Tongritoli   531   P F

Singari

Angara

78   BM 207·8   Sor ngs

FO

Jolma

P O   Carai Panar   559

P F   R F

uri Kotshila Chandrepur Branch Jonha   BM 100·1   TOPO SHEETS   105

390   394

502   376   Serwadag Road R S

inga Ghat R B 385

Hwalara RS   Falls 26 m

Raru, N

Sidamdih

Paika   P F

watoli   Mixed jungle   Bansia   532

Raniharia Pahar 529   Bela   Dowaru

P F   Basantpur

Serengtoli Lati Panar   PO

791   Soring

293   Nawagarh

Sataki   Kokco N

PO

Rahe

Hesutoli

3

ANALYSIS OF RAINFALL DATA

The rainfall data from 1983 to 2003 has been shown in table no. 1

The following observation are made:

(A) Refer table no 2: the average rainfall from Jan to Dec for the above mentioned period (21ST YEARS) is 1290.7 cm or 129.07 cm.

Monsoon rainfall from June to September is 83.92 % of the average rainfall during 21st year whereas from Jan to May it amounts to 3.91 % and from Oct to Dec it amounts to 12.17 % of average discharge. Hence, it is necessary to store the water for continuous generation of power, as there is a wide variation in rainfall during the year. The storage capacity can be so calculated with the help of mass curve.

Table 3 shows the yearly average rainfall (21 years data).

The average rainfall is 129.07 cm.

Assuming 20 % losses, the estimated rainfall per year comes out to be (129.07) (1- 0.2) = 103.25 cm.

So from probability theory causes of average rainfall 129.07 cm. Is about 42 %. (Column 6 of table).

For 103.25 cm rainfall, it is about 60 % (Column 6).

Even for the worst case rainfall of 90 cm the probability is 75 %.

Hence, it is suggested that 100 cm rainfall, the hydro – electric project can be analyzed.

Catchment area of the Sita fall = 34.81 sq. kms.

Discharge calculation:

(a) Ryve's Formulae

$$Q = C A^{2/3} \qquad\qquad C = 10.1 \text{ (For hilly area)}$$

$$= 10.1 \times 34.81^{2/3}$$

$$= 351.56 \text{ cu mt}$$

(b) From catchment area and corresponding annual rainfall of 100 cm.

Total water available for power generation

$$= A \times 10^6 \times 1 \times 0.8 \text{ cubic meter per year}$$

$$= (34.81 \times 10^6 \times 1 \times 0.8) / (365 \times 24 \times 3600) = 200 \text{ cu mt}$$

Power generation

When head = 36 m ✓

Power = 1.37 Mw ✓

RAINFALL DATA (TABLE1)

Monthly Rain fall Data from year 1983-2003

Year	Jan.	Feb.	Mar	April	May	June	July	Aug	Sept.	Oct.	Nov.	Dec
1983	2	20	5	21	63	288	360.3	321	270	85	0	22
1984	36	9	0	0	28	249	175	392	105	11	0	0
1985	13.3	29	7	9	30	75.6	204.2	259	148.6	244.4	0	0
1986	0.4	7	7	12	51.5	136	336.2	92	114	52	120	35
1987	4	11	5.2	10	23	55	155	360	162	0	52	0
1988	0	19	16	3	0	138	324	93.7	69.5	22.6	0	0
1989	0	0	0	0	19	52	173.7	273.8	313.6	36	4.5	10.2
1990	0	5.6	24.3	15.3	17.9	49.7	439	151.8	122	34.9	9.4	0
1991	0	0	0	0	0	134.4	100.9	510.9	172.4	0	0	18.6
1992	0	0	0	4	30.6	118.6	134.5	269.7	161.9	15	0	0
1993	0	2.5	11.2	41.7	48	332.4	324.4	362.9	503.6	41	35	0
1994	43.5	35.1	0	91.2	23	835.4	917.3	544.6	159.4	168	60.4	0
1995	23	38	0	0	0	168.4	638.6	550.3	375.2	39	71	41
1996	25	28	0	0	0	148	298	668	191	16	0	0
1997	12	8	12	67	0	242	469	718	344	37.4	36.2	63.2
1998	61	20.2	48.4	24	53	125	244.6	293.5	588	106.8	12	0
1999	0	0	0	0	55.5	238.6	401	371.7	207.6	126	5	0
2000	12	0	0	33	175.2	177.2	300.5	248.3	254.1	0.8	0	0
2001	0	10	11	6	37.4	167	280.3	238.8	68	98	0	0
2002	6	6	15	14	15	288	140	248.5	365	94	10	4
2003	0	20.4	26.4	14	25	83	350	207	203.8	302.1	27	0

TABLE 2

Rainfall Data From 1983 TO 2003 Month wise in mm

Month	Rainfall (mm)
January	238.2
February	268.8
March	188.5
April	365.2
May	695.1
June	4071.3
July	6671.5
August	7175.5
September	4828.7
October	1521.0
November	334.5
December	194.0
Total	**27106.6 mm**

Average (21 years record) = 129.07 cm

During monsoon period (June to September) amounts to 83.92 % of average discharge. Whereas from January to May amounts to 3.91 % of average discharge and October to December amounts to 12.17 % of average discharge.

Geological investigation TABLE no-3
Rainfall Data from 1983 to 2003 in mm

Year	Rainfall (cm)	Values Arranged Analyzed in order of Magnitude	Order	Frequency	Causes %
1983	146.16	287.79	1	21	4.76
1984	100.44	200.88	2	10.5	9.52
1985	144.00	193.55	3	7	14.28
1986	96.24	160.27	4	5.25	19.04
1987	83.64	157.65	5	4.20	23.80
1988	68.58	146.16	6	3.5	28.57
1989	88.20	144.00	7	3.0	33.33
1990	86.99	140.54	8	2.625	38.09
1991	93.72	130.40	9	2.33	42.91
1992	73.43	125.87	10	2.10	47.6
1993	160.27	120.55	11	1.909	52.38
1994	287.79	120.11	12	1.75	57.14
1995	193.55	100.44	13	1.615	61.91
1996	130.40	96.24	14	1.50	66.67
1997	200.88	93.72	15	1.40	71.42
1998	157.65	91.65	16	1.31	76.33
1999	140.54	88.20	17	1.23	81.30
2000	120.11	86.99	18	1.17	85.47
2001	91.65	83.64	19	1.10	90.9
2002	120.55	73.43	20	1.05	95.23
2003	125.87	68.58	21	1.0	100

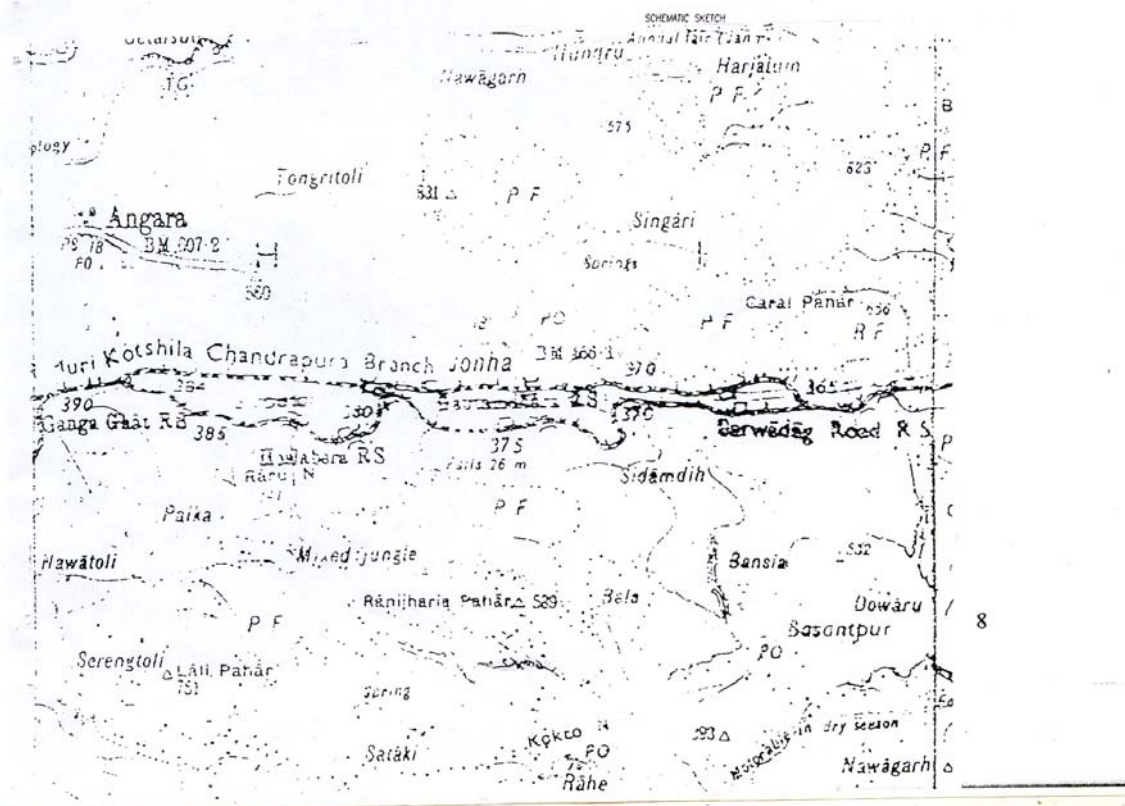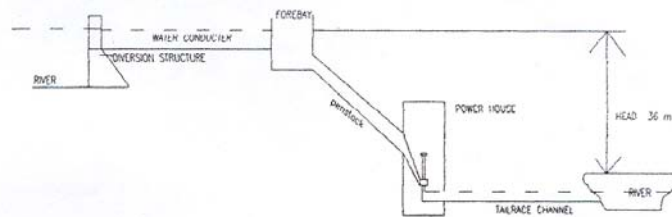For average rainfall of 129.07, causes from the table is 42 %
For 100 cm rainfall causes is 62 %
For 90 cm rainfall causes is 75 %

Preliminary layout

The preliminary layout is outlined below in the relevant portion of Top sheet. During the site visit the head was measured as 80m and is indicated in the schematic sketch.

Fig. Schematic sketch:-

Conclusion:-

Keeping in mind that the streams & rivers in Jharkhand is rain fed, Sita fall SHP Site has a very good potential. Besides, supplying power to near by 25 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.

The Sita fall SHP will utilize a part of potential that is planned for Raro Hydel project. As such Sita fall SHP can only be considered in case Raro Hydel project