

# WEST SETI AND SR6 JOINT STORAGE HYDROELECTRIC PROJECT

## SALIENT FEATURES

SN	FEATURES	CHARACTERISTICS
<b>GENERAL</b>		
1	Name of the Project	West Seti and SR6 Joint Storage Hydroelectric Project
2	Sector	Hydropower
3	Type	Storage Type hydropower project with combined installed capacity of 1200 MW( 750 MW West Seti and 450 MW proposed from SR6)

## WEST SETI

### PROJECT LOCATION

1	Province	Sudurpaschim
2	Project Location	Bajhang, Doti and Dadeldhura ( <a href="#">Location Map</a> )
3	Project Area	West Seti Storage project is proposed to develop on Seti river. West Seti is proposed to develop at Doti and Bajhang districts. The nearest airport to the site is at Dhangadi which is about 180 Km away from project sites. Dipayal bazaar is around 180km from Dhangadi, can be reached from in around 6 hours' drive. West Seti proposed headworks lies around 42km through rural road from Dipayal.

SN	FEATURES	CHARACTERISTICS
<b>PROJECT FEATURES (SMEC STUDY 1997)</b>		
1	Project Layout	Concrete Face Rock fill Dam is arranged at the riverbed; Open Spillway, Flood Discharge and Sand Sluicing Tunnel, and Ecological Outlet is arranged at the Right bank; Headrace-type underground hydropower station is arranged at the middle left bank of the reservoir; Five hydro generating units are installed in the station, with the unit capacity being 150MW
2	Climate	Seti River Basin is located at the south side of Himalaya Mountains. The whole basin belongs to the same monsoon climate, and the climate varies slightly from region to region due to different altitudes. Generally, it is warm and rainy on the south slope and relatively dry on the North Slope. It is cold and dry in the winter. Snow on the top of mountains is the major form of rainfall in winter. The highest temperature usually appears in the middle of June before the coming of summer monsoon. The melting of ice and snow in May increases river flow. Precipitation data show that 28% rainfall in Seti River Basin occurs during the non-monsoon period. From May to June, southwest monsoon brings the rainfall. According to data from precipitation stations in the basin, annual precipitation is between 1,266mm and 2,178mm.
3	Geology	The proposed dam of West Seti Hydropower Station is located between two regional faults. The north side is 35km away from the main thrust fault while the south side is 70km-80km away from the Maximum Continuous Thrust (MCT). Such faults are the major ones formed by Indian Plate moving toward Nepal-Tibet Plate at a small angle; there are some other faults in the reservoir area. There is a N20° 30°E fault from dam site to reservoir area, which is of translation and offsetting.
4	Hydrology	Catchment Area: 4250 km <sup>2</sup> Mean Annual Inflow : 6346 Million m <sup>3</sup> /sec (Note: There is a Hydrological station of Department of Hydrology and Meteorology (DHM) namely just downstream of proposed dam site: Station Number 259.2: Gopa Ghat)

SN	FEATURES	CHARACTERISTICS
----	----------	-----------------

**TECHNICAL COMPONENTS (AS PROPOSED BY SMEC STUDY 1997)**

1	Diversion	Two Inverted D type diversion tunnel of 12.8m diameter 682m and 667 m in length respectively carrying diversion discharge of 3500 m <sup>3</sup> /sec per tunnel. An earthen coffer dam around 35 m height upstream of the dam.
2	Dam	A 195 m high concrete faced, gravel filled storage dam. The crest elevation of the dam is 1290 masl, an ungated controlled chute type Spillway at elevation of 1280 masl. Proposed Dam location: The proposed dam site is located about 33km upstream of Seti Bridge at Dipayal Bazaar, and 186km away from Dhangadhi, the capital of Seti Zone. (Tentative Coordinate: 29°24'42"N Latitude and 80°51'40"E Longitude)
3	Reservoir	Full supply Level: 1280m Minimum Water Level: 1225m Dead Storage Level: 475m Live Storage: 1900 MCM
4	Intake	Intake at 5km upstream of the dam leading to headrace tunnel.
5	Waterway	<ul style="list-style-type: none"> <li>■ Headrace Tunnel: 10 m diameter, around 6.7km long Inverted D type headrace tunnel at the intake.</li> <li>■ Vertical Shaft: around 167m long a vertical drop shaft.</li> <li>■ Penstock Pipe: 365 m long pressure tunnel dividing five 3 m diameter steel lined pressure conduits, one for each generating units.</li> </ul> <p>The tunnel across the large loop of the river allows an extra 100 m head to be gained</p>
6	Powerhouse	An underground power station, 300 m below the ground level. With turbine, transformers and switching stations. Proposed Powerhouse location: 29°18'2.23"N and 80°50'11.56"E )
7	Turbine	<p>Five 150 MW rated Vertical Axis Francis turbine with,</p> <ul style="list-style-type: none"> <li>■ Rated Turbine Net Head= 258 m (operates at design discharge of 327 m<sup>3</sup>/sec)</li> <li>■ Maximum Net Head – 272m (when all the 5 units operates at Full Supply Level with maximum discharge of 335m<sup>3</sup>/sec)</li> <li>■ Minimum net head = 219m ( when all the 5 units operates at dam minimum operating level with minimum discharge of 304m<sup>3</sup>/sec)</li> <li>■ Tail water Level : 1266m</li> </ul>

SN	FEATURES	CHARACTERISTICS
8	Tailrace	A 10 m diameter, 620 m long Tailrace tunnel discharging the flow back to the Seti River.
9	Energy Generation	<p>The powerhouse operates for 8 hour in dry season whereas 24 hour operation is proposed for wet season.</p> <p>Annual Electricity Generation= 3300 GWh</p> <ul style="list-style-type: none"> <li>■ Primary Energy: 2928 GWh</li> <li>■ Secondary/seasonal energy: 402 GWh</li> </ul> <p>The dry season monthly generation target: 169 GWh</p> <p>The wet season monthly generation target: 366 GWh</p>
10	Power Evacuation	As proposed from SMEC study, the power evacuation to be carried by 400 KV double circuit transmission line to proposed Nepal India border which is around 90Km long.

## SR6

### PROJECT LOCATION

1	Province	Sudurpaschim
2	Project Location	Doti and Accham districts ( <a href="#">Location Map</a> )
3	Project Area	The nearest airport to the site is at Dhangadi which is about 180 Km away from project sites. Dipayal bazaar is around 180km from Dhangadi, can be reached from in around 6 hours' drive. There is no dedicated access road to the SR6 project site, the nearest access road in proximity to the site is Dipayal - Gauguda rural road. The dam-toe-powerhouse site was proposed around 2 km downstream from the confluence of Budhi Ganga and Seti River and 19 km upstream from the confluence of Seti River with Karnali River.

### PROJECT FEATURES (JICA MASTER PLAN STUDY 1993)

1	Project Layout	Concrete Gravity Dam is arranged at the riverbed, with headrace tunnel and penstock pipe to carry discharge to powerhouse on the left bank on dam toe with installed capacity of 652 MW at 0.6 draft rate. The various option of the draft rate and subsequent project parameters- technical and financial are listed by the study.
2	Hydrology	<p>Catchment Area: 7213 km<sup>2</sup></p> <p>Design discharge at 0.6 draft rate: 434 m<sup>3</sup>/sec</p> <p>(Note: There is a Hydrological station of Department of Hydrology and Meteorology (DHM) downstream of the project site namely: Station Number 260: Banga)</p>

SN	FEATURES	CHARACTERISTICS
----	----------	-----------------

### TECHNICAL COMPONENTS (AS PROPOSED BY IBN DESK STUDY)

#### Initial Technical Proposal as per JICA Study 1993

1	Dam	Concrete gravity dam 207m high at 0.6 draft rate			
2	Waterway	Headrace Tunnel: 1.5 km Penstock Pipe: around 100m of penstock pipe			
3	Powerhouse	A surface power station, downstream of toe of the dam on the left bank. The Tail water elevation to be fixed at 401 m.			
4	Energy Generation and other parameters				
	S.N	Parameters	Features at draft rate		
			0.6	0.7	0.8
	1	Plant Discharge (m <sup>3</sup> /sec)	434	507	579
	2	Full Supply Level (m)	603	613	639
	3	Minimum Operating Level (m)	557	557	557
	4	Tail Water Level (m)	401	401	401
	5	Installed Capacity (MW)	642	776	966
	6	Firm Energy (Gwh/yr)	1841	2240	2809
	7	Secondary Energy (Gwh/yr)	799	752	690
	8	Total Energy (Gwh/yr)	2640	2992	3499

The draft rate is basically the ratio of constant release from the reservoir throughout the year to the long-term average flow.

#### IBN Desk Study Proposal (Keeping other component constant as previous study IBN team revised the Full Supply Level and Dam Height.

1	Decrement in Dam Height	At the full supply height of 603m proposed for 0.6 draft rate, the proposed water level will inundate the two large market center of the area. Dipayal (the former headquarter of Far-western development region) which lies at the elevation of 575m will be completely inundated while Sanfebagar (highly populated market centre of Achham district) which lies at elevation of around 595m will partially inundated even in the lowest draft option proposed by previous studies. Dipayal is also one of the proposed site for the Headquarter of Sudarpaschim Province while Sanfebagar is the biggest market centre of Achham district with functioning airport. Additionally the proposed FSL will also inundate a section of Martadi-Dipayal highway. Hence, IBN proposed a revision in Full Supply Level to 520m in order to minimize the risk to the Seti Bridge and possibility of resettlement of large section of Dipayal bazaar.
---	-------------------------	--

SN	FEATURES	CHARACTERISTICS
2	Installed capacity after revision in dam height	<ul style="list-style-type: none"> <li>■ This revision in Dam height decreases the reservoir capacity</li> <li>■ A generic assumption will be that the design discharge will also decrease by half to 217 cumec because reservoir pondage ability will decrease.</li> <li>■ With decrease in discharge and dam height, the technically possible power production will decrease from 642 MW to 228 MW. <ul style="list-style-type: none"> <li>■ Also the plant will not be functional for 50 years, As:</li> <li>■ Due to the continuous sediment inflow, the sediment influx will be higher than the proposed dam height i.e. if we calculate the minimum operating level for current sediment inflow( as stated by JICA report), it is around 557masl whereas the revised dam height of 120m only allows the operating level of 520masl.</li> </ul> </li> </ul>
3	When West Seti and SR6 are developed together even with Dam height revision	<ul style="list-style-type: none"> <li>■ First the Sediment trapping at West Seti dam will drastically decrease the sediment inflow into the SR6, even with revision of dam height, the plant will be operational for 50 years.</li> <li>■ The West Seti plant as per SMEC proposal 1997 will release at-least 305 m3/sec water after electrical generation, 24 hours in wet season and 8 hours in dry season which allows the SR6 to operate at original design discharge of 434 m3/sec</li> <li>■ First the Sediment trapping at West Seti dam will drastically decrease the sediment inflow into the SR6, even with revision of dam height, the plant will be operational for 50 years.</li> <li>■ As the flow will be ensured of minimum 434 m3/sec, under the revised height, the installed capacity will be 450 MW for SR6 with combine installed capacity of 1200 MW (750 MW of West Seti and 450 MW of SR6).</li> </ul>

SN	FEATURES	CHARACTERISTICS
----	----------	-----------------

#### DEVELOPMENT MODALITY

1	Development modality	Public Private Partnership
2	Role of the Government of Nepal	<ul style="list-style-type: none"> <li>■ Provision of government land, land acquisition, facilitation and project security</li> <li>■ Facilitating legal approvals/permits</li> <li>■ Review &amp; monitoring</li> </ul>
3	Role of the Private Sector	<ul style="list-style-type: none"> <li>■ Plan, design, build, finance and operate the facilities during the Concession Period</li> <li>■ Collection of revenues from the project during the Concession Period</li> <li>■ Handover to the Government after the Concession Period</li> </ul>

#### INDICATIVE FINANCIALS

1	Total Project Cost of West Seti (including interest during construction, finance cost and 400 kV double circuit transmission line cost to Nepal India border)	USD 1097.7 million
2	Estimated Total project cost in 1993 for 652MW earlier proposed SR6 (for reference)	USD 927 million for 0.6 draft rate

# APPLICATION PROCEDURE

## PRE-QUALIFYING CRITERIA FOR THIS PROJECT

1. Minimum of 10 years of experience in field of energy project development, investment and management.
2. Evidence of Hydropower Projects Owned/Constructed/Operated Around the World. At Least Two Reference Projects Of At Least 500 MW (Out Of Which One Should Be Of Storage Operation), With Verifiable Evidence.  
or,  
Evidence Of Development And Operation Of Energy Projects With Aggregate Capacity Of Minimum 4000 Mw.
3. The combined Net worth of the applicant shall not be less than USD 1.5 Billion (United State Dollar One Billion Five Hundred Million) at the time of submission of bid.

## APPLICATION PROCEDURE

1. The developer/ investor who meet the above pre-qualifying criteria can make the application for this project.
2. Application may be made by a single entity or a group of entities (Consortium or JV) comprising up to three different companies/ parties, including a Lead member, coming together to implement the project.
3. A consortium/JV may fulfil the pre-qualifying criteria in a joint/cumulative manner, except for the number of years of work experience.
4. A fee of NRs 10,000 shall be payable for each application made (with application to one project counting as a single application).
5. The fee must be paid to OIBN (to the OIBN office or a dedicated desk at the Nepal Investment Summit), or by electronic transfer to the following bank account of OIBN:

**Office Code: 301003502**

**Office Name: Office of the Investment Board**

**Revenue Heading: 14229**

**Bank Name: Everest Bank Ltd.**

**Swift Code: EVBLNPKA**

Please use 'Company name\_Project name' as the reference code for the payment made in the case of an online payment.

6. After payment of the fee is made, the OIBN shall assign an engagement manager and may provide additional documents or information relevant to the project (if available).

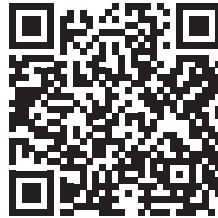


7. Applicants should submit the detailed proposal with all required documents by 20th April 2019. Applications shall be submitted in physical copies to the OIBN or emailed to projects@ibn.gov.np.
8. The Government of Nepal (OIBN or relevant government agency at the relevant level of government) shall review the proposal and ask additional information if required.
9. The Government of Nepal shall decide on your application by 31st May 2019.

## DETAILED PROPOSAL CHECKLIST

1. Detailed profile of the developers/ investors, including profile of senior management team, annual report and audited financial statements for at least past three years (2015, 2016 & 2017), and consortium agreement or JV agreement or Memorandum of Understanding in the case of consortiums or JV.
2. Project concept, plan, and information on financial, economic, technical and environmental feasibility.
3. Method of project implementation, project development modality and work schedule
4. Business plan with basic financial statements
5. Financial arrangement and source of investment
6. Socio-economic contribution to Nepal
7. Expected support from GoN
8. Other relevant information, if any

**APPLY NOW**



---

## CONTACT DETAILS



### **Office of the Investment Board**

ICC Complex, New Baneshwor  
Kathmandu, Nepal  
Phone: 977-1-4475277, 977-1-4475278  
Fax: 977-1-4475281  
Email: projects@ibn.gov.np