

# SPARK HYDROELECTRIC COMPANY LIMITED

Kathmandu, Nepal

TAMOR MEWA HYDROELECTRIC PROJECT (128MW)

Taplejung, Nepal



## COMPANY PROFILE

2024



Spark Hydroelectric Company Limited

Kathmandu, Nepal

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## COMPANY PROFILE



Spark Hydroelectric Company Limited (SHCL) was established on 14<sup>th</sup> of Mangsir 2056 BS as the Public Limited company with a company registration no 721/056/57 according to Company Act 2053 with the aim to generate electricity utilizing Tamor and Mewa River from Tamor-Mewa Hydroelectric Project 128 MW. The company has been later updated as per the Company Act 2063. SHCL obtained the Industry Registration on 27<sup>th</sup> Jetha 2075 with Industry Registration No 5206. The corporate office of SHCL is in 2<sup>nd</sup> Floor, Team Ventures Building, Sinamangal, Kathmandu.

SHCL is committed towards its mission and objectives with strong coordination with all the stakeholders. With a core belief in sustainability development, SHCL maintains a constant involvement with locals and

community programme which focuses on rural infrastructure development, education and health sector. SHCL executes in building public-private-people alliances for sustainable development.

SHCL is always eager to adopt and encourage the use of new technology and innovation in order to receive the optimum organizational objectives and business result supported by group of optimistic personnel and work environment. SHCL believes in use of cutting edge technologies and innovative state of the art technologies for optimum utilization of natural resources through effective management. SHCL executes the projects through efficient and competent contract management and innovative R &D in environment friendly manner.

# BOARD OF DIRECTORS

## MR. BHANENDRA KUMAR LIMBU - FOUNDER/CHAIRMAN



Mr. Bhanendra Kumar Limbu holds Bachelor Degree in Nepali Literature (Humanities) from Tribhuvan University (TU) of Nepal. He is the Founder of Spark Hydroelectric Company Limited, Nepal. Spark Hydroelectric Company Limited was established in his leadership 23 years ago (in 14th Mangsir, 2056 BS) with having its purpose to develop hydroelectric projects in Nepal.

| SN | Firms/Companies                     | Designation      |
|----|-------------------------------------|------------------|
| 1  | Spark Hydroelectric Company Limited | Founder/Chairman |

## MR. SUDIP KUMAR CHAUDHARY - MANAGING DIRECTOR



Mr. Sudip Kumar Chaudhary holds Master's Degree in Construction Management (PU), Masters in Economics and an Engineering Degree (Bachelor in Civil Engineering from IoE, Pulchowk, TU). Mr. Chaudhary is involved in the energy development business since last 15 years. Professionally he has been involved in development, planning, design, monitoring and management construction supervision of dozens of hydropower and solar PV Projects. The major experiences are listed below:

| SN | Firms/Companies  | Designation        |
|----|--|--------------------|
| 1  | Spark Hydroelectric Company Limited (Tamor Mewa HEP 128 MW)  | Managing Director  |
| 2  | Him River Power Limited (Liping Khola HPP 16.26 MW)  | Executive Chairman |
| 3  | Prakash Solution Pvt Ltd (Super Palung HPP 30 MW)  | Managing Director  |
| 4  | SN Energy Limited ( Super Seti HPP 24 MW)  | Chairman           |
| 5  | Sunlight Energy Pct Ltd (Udayapur Solar PV Project 10 MW)  | Managing Director  |
| 6  | Terai Village Pvt Ltd (Eco-Farm Tourism Developer)   | Chairman           |
| 7  | Mardi HPP-4.8 MW, Upper Mardi HPP 7 MW, Bijayapur-I HEP 4.5 MW, Bijayapur-II HPP 4.5 MW and Madkyu Khola HPP-13 MW | Project Manager    |
| 8  | S & U Consult Pvt Ltd ( Engineering Consulting Firm-Hydropower)  | Managing Director  |

## MR. NAVARAJ RAUT - DIRECTOR



Mr. Navaraj Raut is a dynamic and energetic business person having more than 30 years of experience in various business sectors including furnishing, interiors, trading, manufacturing, dairy products, financial institution, hydropower etc. His professional behavior, value to fellow staffs and other counterparts and in depth knowledge are the keys to his success. Mr. Raut, a permanent resident of Kathmandu holds Master degree in Business Administration and is the founder of several other enterprises.

| SN       | Firms/Companies  | Designation  |
|----------|--|--|
| 1        | Super Mai Hydropower Ltd (SuperMai HPP 7.8 MW)                           | Director   |
| 2        | Spark Hydroelectric Company Limited (Tamor Mewa HEP 128                  | Director   |
| 3        | Him River Power Limited ( Liping Khola HPP 16.26 MW)                     | Director   |
| 4        | Aakriti International Pvt Ltd  | Chairman and MD  |
| 5        | Aakriti Trading Pvt Ltd  | Chairman and MD  |
| 6        | Ashra International Pvt Ltd  | Chairman   |
| 7        | AI Industries Pvt Ltd  | Chairman   |
| <b>8</b> | <b>Alpine Development Bank (Now Merged wit Century Development Bank)</b> | <b>Chairman (2007 to 2012)<br/>BoD from 2012 till Merged</b> |

## MR. KIRAN KUMAR SHRESTHA - DIRECTOR



Mr. Kiran Kumar Shrestha holds a Bachelor's Degree in Law and he is a founding director of Ashra International. He has 20 years of experience as a Director in trading and interior fields. His business professionalism, experience, dedication and zeal for continual improvement have made him successful person in his field. His involvement in business is as follows:

| S.N. | Firms/Companies  | Designation        |
|------|--|--------------------|
| 1    | Him River Power Limited ( Liping Khola HPP 16.26 MW)     | Director           |
| 2    | Spark Hydroelectric Company Limited (Tamor Mewa HEP 128) | Director           |
| 3    | AI Industries Pvt Ltd                                    | Executive Director |
| 4    | AI Trading Pvt Ltd                                       | Director           |
| 5    | Awash Enterprises Pvt Ltd                                | Executive Director |
| 6    | Ashra International Pvt Ltd                              | Managing Director  |
| 7    | Aakriti Trading Pvt Ltd                                  | Director           |

## MR ISHWORI BAHADUR ADHIKARI - DIRECTOR



Mr. Ishwori Bahadur Adhikari, born and brought up in western part of Nepal, is professionally an educator. He has earned Masters' degree in English Literature from TU, Nepal and another degree in Education from ACU Australia. Over his career for last 35 years with different hats, he taught, founded and took a lead role in various institutions and companies. Besides, he is a passionate businessman with purpose. He is well travelled and smooth personality with interest in various areas including reading, exploring and meditation.

| S.N. | Firms/Companies   | Designation       |
|------|---|-------------------|
| 1    | Ganesh Himat Hydropower Pvt Ltd (Akhu Khola HPP 20 MW)      | Chairman          |
| 2    | Gorakshya Hydropower Pvt Ltd (Super Aakhu HPP 25.4 MW)      | Director          |
| 3    | Spark Hydroelectric Company Limited (Tamor Mewa HEP 128 MW) | Director          |
| 4    | Pathshala Nepal Foundation                                  | Founder/CEO       |
| 5    | Medhavi College   | Director          |
| 6    | Pai Investment  | Managing Director |
| 7    | PABSON  | Member            |
| 8    | HISSAN  | Member            |

## MRS. SMRITI LIMBU - DIRECTOR (FEMALE)



Mrs. Smriti Limbu holds an MSc in International Business from the University of West of England and Bachelor Degree of Business Administration from TU, Nepal. She is professionally a banker in TD Bank of Canada at present. Her corporate experience in bank and data analyst in project management firm and communication assistant in public forum has made her proficient in major aspect of an organization.

| SN | Firm/Companies  | Designation       |
|----|---|-------------------|
| 1  | Spark Hydroelectric Company Limited (Tamor Mewa HEP 128 MW) | Director (Female) |
| 2  | TD Bank, London, Ontario (Canada)                           | Business Analyst  |
| 3  | PMI South Western Ontario (Canada)                          | Data Analyst      |
| 4  | Lord Buddha Thanka Art Multipurpose Cooperative Society     | Accountant        |

## MR. BALADEB CHAUDHARY - DIRECTOR (INDEPENDENT)



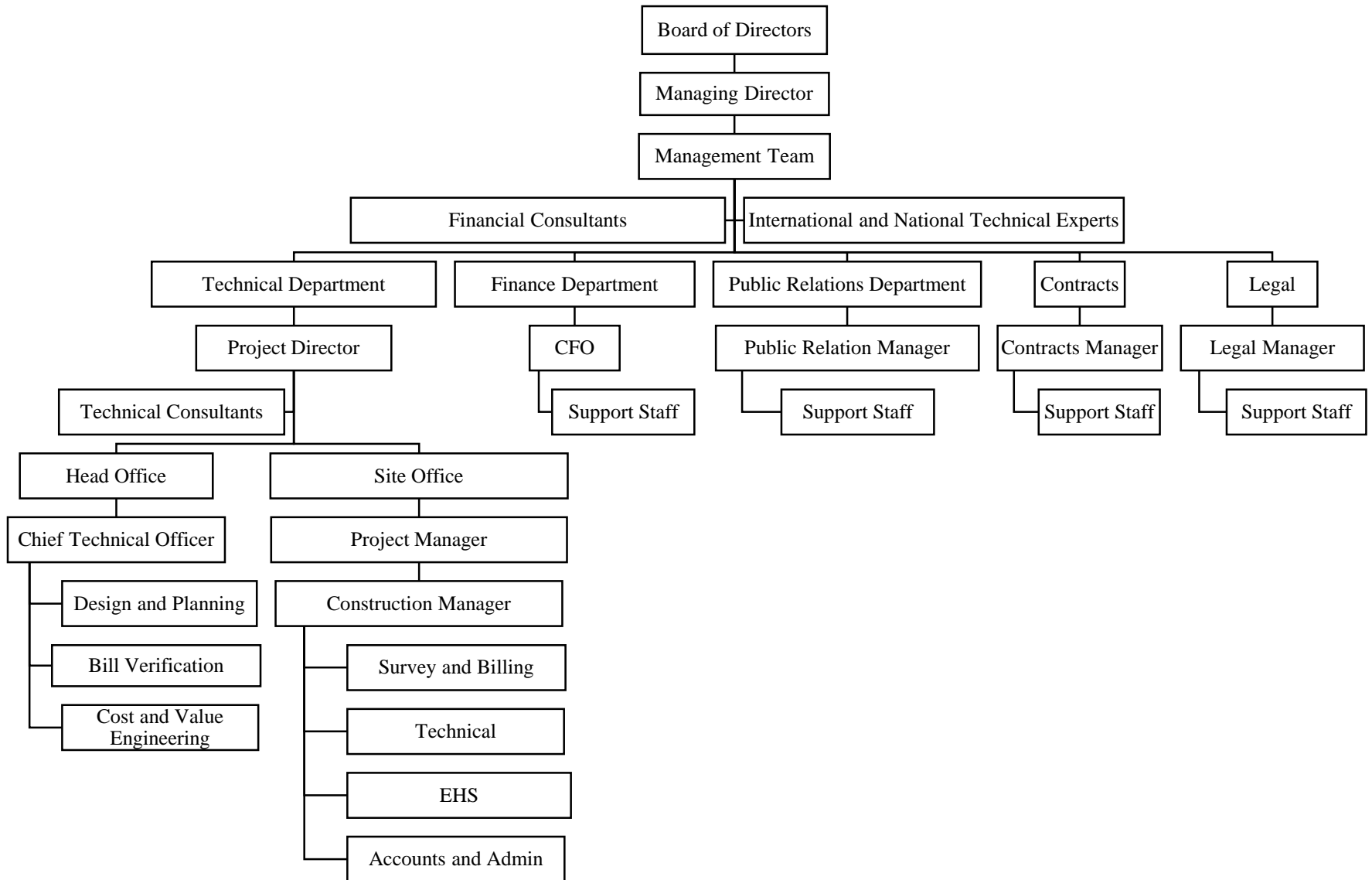
Mr. Baladeb Chaudhary is a highly accomplished professional with extensive experience in law, leadership roles and community development. He has completed Bachelors in Law from TU. He is seeking a challenging position to utilize expertise in legal affairs, management, and public service to the growth and success of an esteemed organization. His public relations experience has added more strength in the organization.

| SN | Institutions  | Designation |
|----|---|-------------|
| 1  | Legal Service Center Udayapur (from 20 years)       | Advocate    |
| 2  | Nepal Bar Association, Udayapur ( 4 times)          | Chairman    |
| 3  | Community Legal Research Center, Udayapur (5 times) | Chairman    |
| 4  | Triyuga Municipality Udayapur ( 2074- 2079)         | Mayor       |
| 5  | Nagar Development committee. Triyuga Udayapur       | Chairman    |
| 6  | District Sport Committee Udayapur                   | Chairman    |
| 7  | Tharu Kalyan Karani Sabha, Udayapur (4 times)       | Chairman    |
| 8  | Triyuga Higher Secondary School, Udayapur (2 times) | Chairman    |
| 9  | Radio Triyuga- Udayapur                             | Chairman    |
| 10 | Baruwa Campus, Udayapur                             | Chairman    |

## BOARD STRUCTURE

| SN | Name                         | Designation            |
|----|------------------------------|------------------------|
| 1  | Mr. Bhanendra Kumar Limbu    | Chairman               |
| 2  | Mr. Sudip Kumar Chaudhary    | Managing Director      |
| 3  | Mr. Navaraj Raut             | Director               |
| 4  | Mr. Ishwori Bahadur Adhikari | Director               |
| 5  | Mr. Kiran Kumar Shrestha     | Director               |
| 6  | Mrs. Smriti Limbu            | Director (Female)      |
| 7  | Mr. Baladeb Chaudhary        | Director (Independent) |

# ORGANISATION STRUCTURE





## MANAGEMENT TEAM

### MAJOR STRENGTH OF THE TEAM

The major strength is the practical experience and involvement of the board members in various projects of hydropower sector. The board members have completed and commissioned many hydropower which is the major strength of the team. The board members know the importance of project duration and hence they reflect it in field completing the project within the time frame.

The board has an experience of working in very difficult terrains of Nepal where the access road is not available. These experience and strong enthusiasm in hydropower sector add more energy for successful commissioning of the project.

The team comprising of board members have already completed following projects:

|  |  |   |
|--|--|---|
|  |    |  |
| <b>Super Mai<br/>Hydropower<br/>Project, Ilam<br/>7.8 MW<br/>Commissioned</b>      | <b>Kuthali Bukhari<br/>Hydropower<br/>Project, Dolakha<br/>1 MW<br/>Commissioned</b> | <b>Liping Khola HPP,<br/>Sindhupalchowk<br/>16.26 MW</b>                            |

The board members are also involved in the execution of the following projects:

*Super Seti HPP, 24 MW, Kaski*

*Super Palung HPP, 40 MW, Taplejung*

**THE BOARD MEMBERS ARE INVOLVED IN PROJECTS OF OVER 200 MW INCLUDING  
TAMOR MEWA HPP**

## TEAM

The management team led by the Managing Director, Mr. Sudip Kumar Chaudhary consists of experienced hydropower personnel. The team comprises of technical experts, financial experts, chartered accountants, senior geologists, senior contract professionals, construction managers and senior public relation officers. The team is backed up by international consulting firms, technical experts and financial analysts with an approach to complete the project in estimated time within the estimated budget.



Mr. Sudip Kumar Chaudhary  
Managing Director

- More Than 15 years of experience in development and execution of hydropower projects
- Master of Engineering in Construction Management and Bachelor of Civil Engineering from Pulchowk Campus



Mr. Bam Bahadur Thapa  
Project Director

- More Than 10 years of experience as investor and director in hydropower projects
- Bachelors in Economics



Mr. Nirajan Maharjan  
CFO

- More than 20 years of experience with more than decade in hydropower sectors
- Masters in Business Studies from TU



Mr. Narayan Poudel  
Financial Analyst

- More Than 20 years of experience in financial analysis of hydropower projects
- Chartered Accountant



Mr. Winner Shrestha  
Project Coordinator (Technical)

- More Than 10 years of experience in hydropower construction in Nepal and India with many projects more than 100 MW
- Master of Engineering in Energy System Planning and Management from Pulchowk Campus



Mr. Sujit Kumar Yadav  
Finance Admin

- More than 10 years of experience in financing and Administration works
- Completed Masters of Business Administration

# PROJECT OVERVIEW

## INTRODUCTION

Spark Hydroelectric Company Limited (SHCL) is developing the Tamor-Mewa Hydropower Project 128MW (TMHEP) in Taplejung district in eastern Nepal. The proposed Tamor-Mewa Hydroelectric Project is located along the left bank of Mewa Khola and Tamor River. The project area lies in Phungling Municipality, Meringden,

Mikwakhola and Athrai-Tribeni Rural Municipalities of Taplejung District, Koshi Province of Federal Democratic Republic of Nepal. The geographical boundary of project is between latitude of 27° 20' 00'' N and 27° 24' 08'' N and longitude of 87° 37' 15'' E and 87° 40' 00'' E.

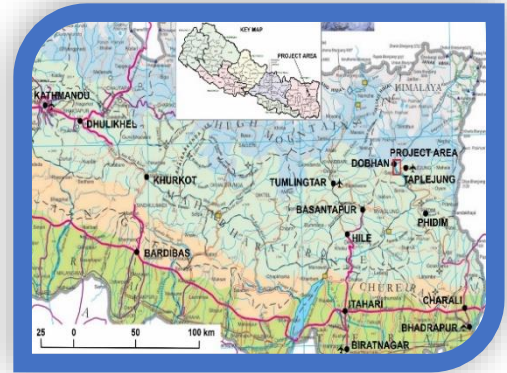
## EARLIER DEVELOPMENT OF PROJECT

During early 1996, the Nepal Electricity Authority (NEA) engaged the Canadian International Water and Energy Consultants (CIWEC) and carried out the feasibility study of some of the Medium Hydropower Projects. NEA, under the Phase I of Medium Hydropower Study Projects (MHSP) work, involved in a screening and ranking exercise of all potential hydropower projects identified with capacity ranging from 10 to 300MW. Tamor-Mewa HEP was one of the identified potential projects. In March 1997 the Phase - I process of MHSP confirmed the selection of Tamor-Mewa Hydroelectric Project as one of the attractive project to proceed to full feasibility study. Accordingly, during the period of 1997 to 1998, the first feasibility study of the project was completed by CIWEC in October 1998.

In 1999, the then Government of Nepal published a notice inviting local and foreign interested company to submit construction proposals for the construction of the hydropower projects studied. Spark Hydroelectric Company Limited had proposed to construct 101 MW Tamor-Mewa Hydroelectric Project out of the available projects. On December 27, 2000, it was informed that the proposal of Spark Hydroelectric Company Limited was approved by the Government of Nepal. Power Generation Survey License was received on March 20, 2006. Authority took long time to renew project and it was renewed on May 13, 2012. Further on March 06, 2014, the licence was re-issued with new license number by DoED.

## PROJECT LOCATION AND ACCESSIBILITY

The proposed Tamor-Mewa Hydroelectric Project is located along the right bank of Mewa Khola and Tamor River. The project area lies in Phungling Municipality (previous Phungling VDC), Meringden, Mikwakhola and Athrai Tribeni Rural Municipalities (Previous Khokling, Khamlung, Santhakra, Chage, Hangpang and Phulbari VDCs) of Taplejung District, Koshi Province of Federal Democratic Republic of Nepal. Proposed headworks area lies near local market of Handrung while powerhouse lies near Guheli village.

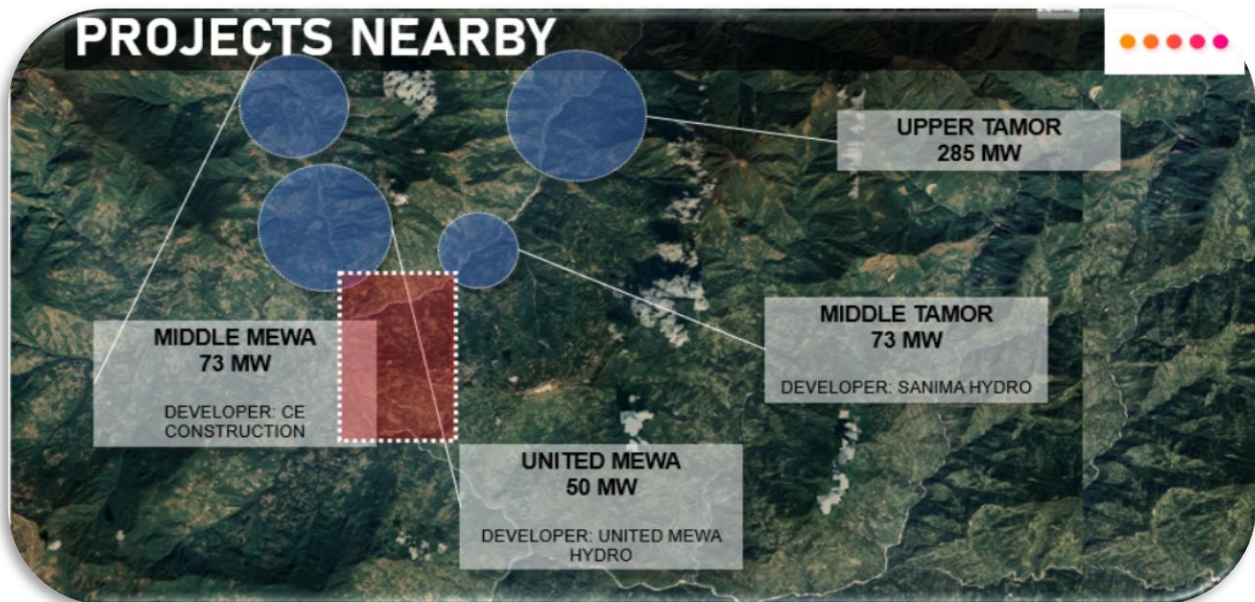


## ACCESSIBILITY

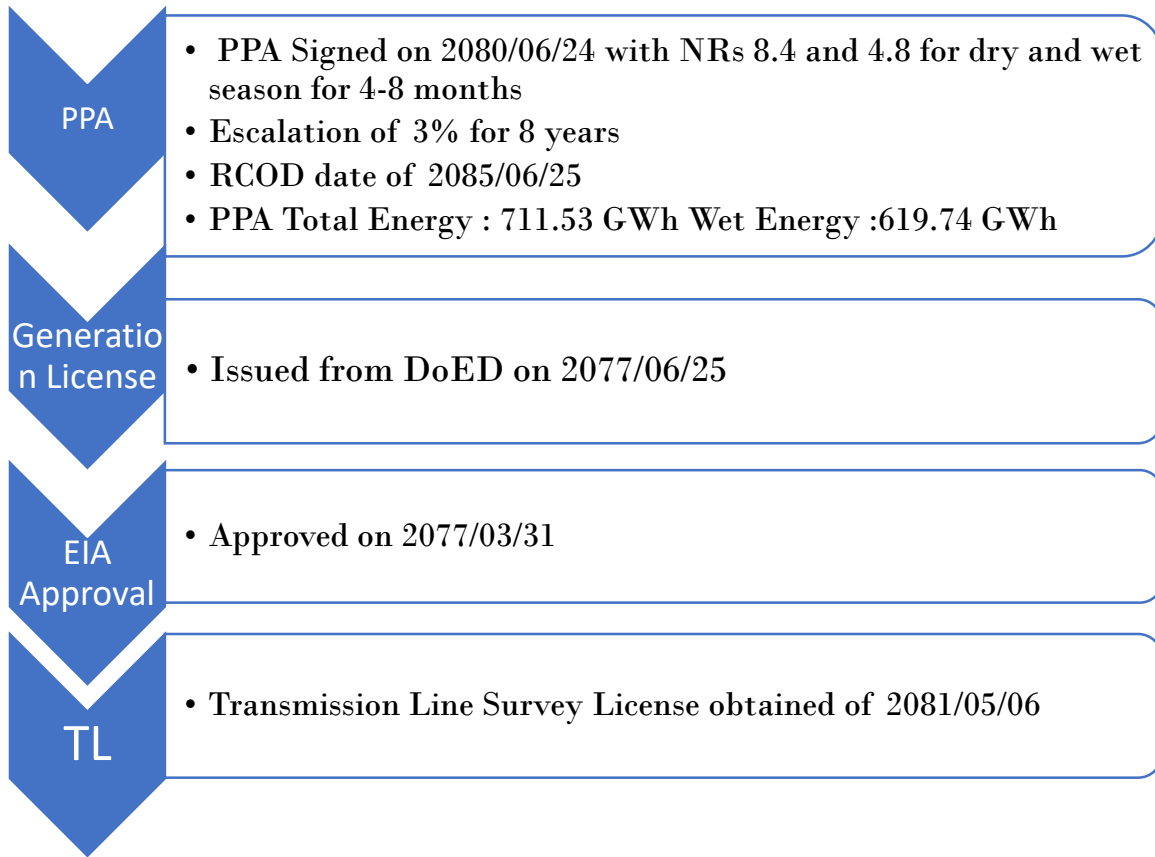
The project site is approximately 830km from Kathmandu via Mugling while it is about 670km via BP Highway by road distance. The main access from Kathmandu to project site will be along the East- West Highway to Jhapa and Mechi Highway from Jhapa to Taplejung via Ilam and Panchthar. The headworks area of project is accessible via fair weather road for about 10km from Bahanande, which lies on the Mechi Highway near Phungling, headquarter of Taplejung district.

The project can also be accessed from Madan Bhandari Highway and Tamor Corridor along Bhiman of BP Highway to Phidim via Dharan, Bhedetar, Mulghat. From Mulghat to Phidim, fair graveled road is available. Alternatively, Biratnagar airport can also be used to reach biratnagar afterwhich from there site can be travelled along Dharan, Bhedetar, mulghat, phidim and site via tamor corridor.

## NEARBY PROJECTS



## LEGAL STATUS



## SOME GLIMPSE

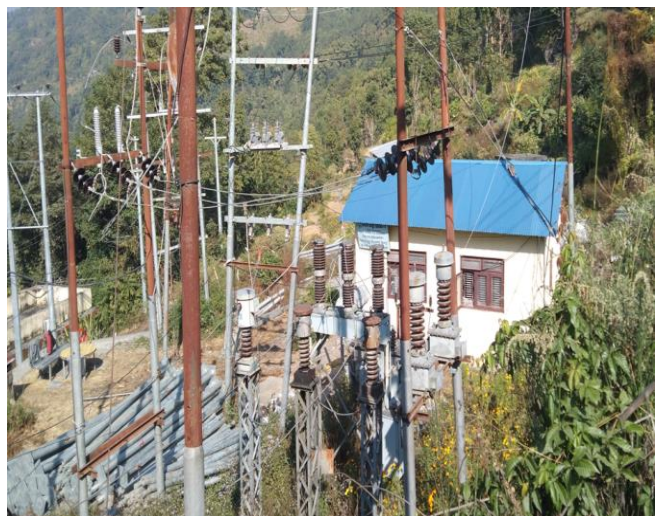
### Ground Breaking of the Project

The project has started the construction works in site with the official program on 10th Jestha 2081.



### Infrastructure Development at Site

The upgradation of access road to the headworks and tunnel inlet have been completed. The upgradation of access road to the powerhouse is on progress. Heavy vehicles can reach the headworks and powerhouse carrying all types of construction equipment and materials. Construction Power and proper communication facilities are available in site.



Access Road for Headworks



Nearby substation of NEA for Construction Power



HRT Inlet

Access to Powerhouse



Powerhouse Location with Access

Surveying at Site

### Site office and camp facilities

The site office has been constructed in headworks region of the project. Further expansion of construction of camp facilities in on progress.

The camp facilities and site office shall be constructed after upgradation of access road to powerhouse.



Motorable bridge in headworks



Ground Breaking Ceremony



Public Participation in Ground Breaking Ceremony



Completed 220/132/33 KV Substation of NEA in Dhungesaghu (Hangpang)





## **SPARK HYDROELECTRIC COMPANY LIMITED**

Spark Hydroelectric Company Limited

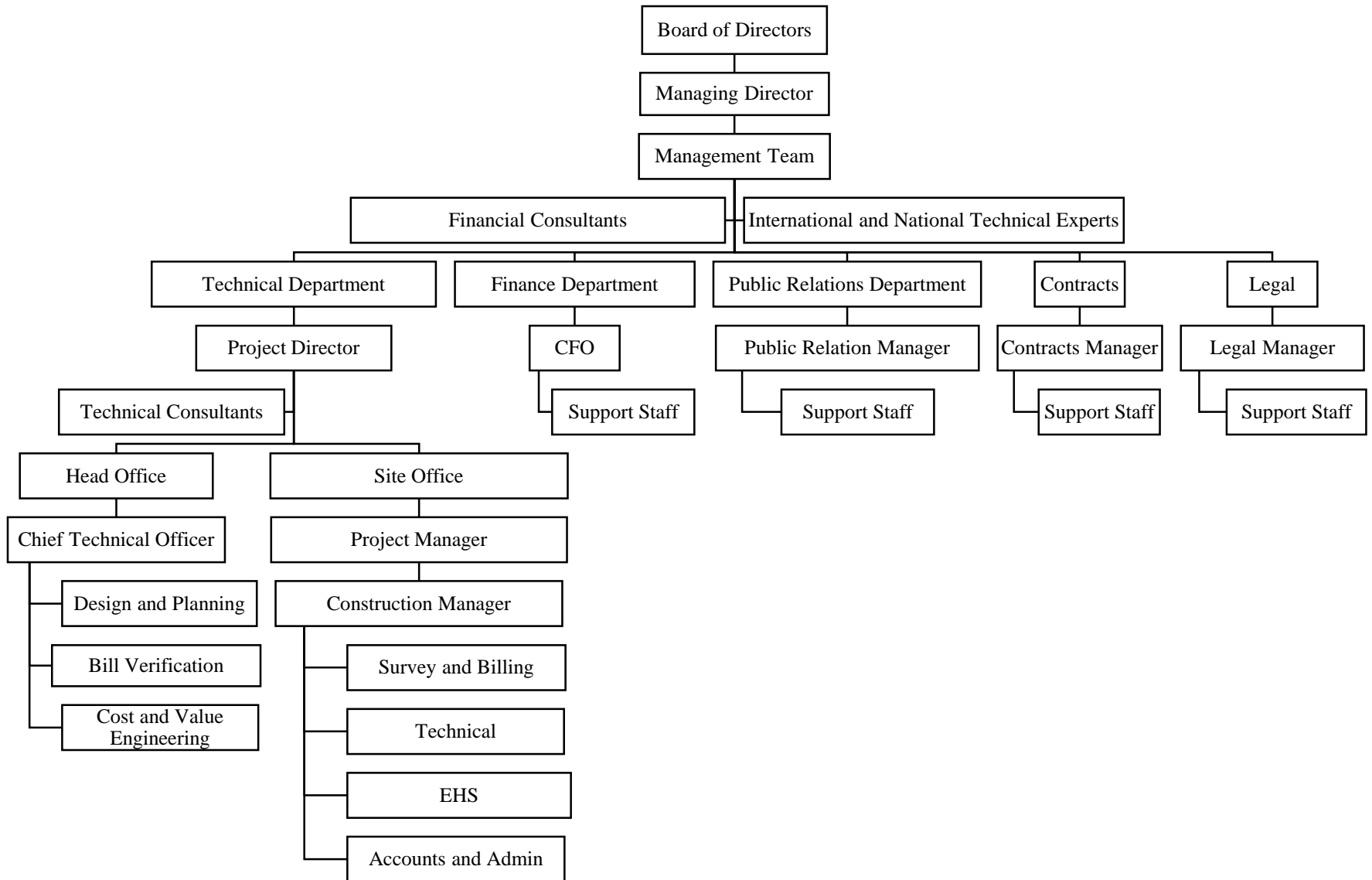
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# ORGANISATION STRUCTURE



## SALIENT FEATURES:

|                                      |   |   |                    |
|--------------------------------------|---|---|--------------------|
| <b>1. General</b>                    |   |   |                    |
| Name of the Project                  | : | Tamor Mewa Hydroelectric Project  |                    |
| Name of River                        | : | Tamor and Mewa  |                    |
| Type of Scheme                       | : | Run-of-the-River (RoR)  |                    |
| District                             | : | Taplejung   |                    |
| Geographical Co-ordinates            |   |   |                    |
| Latitude                             | : | 27°20'00"N, 27°24'08"N  |                    |
| Longitude                            | : | 87°37'15"E, 87°40'00"E  |                    |
| Nearest Town                         | : | Phungling   |                    |
| Access Road Name                     | : | Mechi Highway   |                    |
| <b>2. Organization</b>               |   |   |                    |
| Developer                            | : | Spark Hydroelectric Company Limited                                     |                    |
| <b>3. Hydrology</b>                  |   |   |                    |
| Catchment Area                       | : | Tamor- 2062 km <sup>2</sup>   |                    |
|                                      |   | Mewa- 574 km <sup>2</sup>   |                    |
| Discharge (at 40%PoE)                | : | Tamor- 95.38 m <sup>3</sup> /s  |                    |
|                                      |   | Mewa- 34.18 m <sup>3</sup> /s   |                    |
| <b>4. Sediment Study</b>             |   |   |                    |
| Average annual Sediment load         | : | 9.41 Million Tons/year  |                    |
| <b>5. Geology</b>                    |   |   |                    |
| Regional Geology                     | : | Lesser Himalaya, Taplejung window                                       |                    |
| Major Rock Types in Headworks        | : | Mewa: Augen Gneiss Tamor: schist, phyllite, quartzite, Granatic Gneiss  |                    |
| Major Rock Type in Waterways         | : | Mewa: Mica Schist, Tamor: schist, phyllite, and quartzite intercalation |                    |
| Major Rock Type in Powerhouse        | : | Granitic Gneiss   |                    |
| <b>6. Structures</b>                 |   |   |                    |
| Dam/Weir                             |   | Tamor Scheme  | Mewa Scheme        |
| Type                                 | : | Gated Barrage   | Concrete Overflow  |
| Length                               | : | 85 m  | 45 m               |
| Provision of stilling Basin          | : | Simple rectangular  | Simple rectangular |
| <u>Diversion During Construction</u> | : |   |                    |

|                                   |   |  |                               |
|-----------------------------------|---|--|-------------------------------|
| Construction flood                | : | 665 m <sup>3</sup> /s                        | 390 m <sup>3</sup> /s         |
| Diversion Type                    | : | Embankment                                   | Embankment                    |
| <u>Sluicing</u>                   |   |  |                               |
| Number of bays                    | : | Spillway Gate: 4<br>Undersluice Gate: 2      | 2                             |
| Dimension (B x H)                 | : | Spillway: 10m x 7m<br>Undersluice: 10m x 12m | 5m x 4m                       |
| Gate type                         | : | Radial                                       | Vertical Lift                 |
| <u>Intake Structure</u>           |   |  |                               |
| Type of Intake                    | : | Submerged<br>Concrete orifice                | Submerged<br>Concrete orifice |
| Nos of Opening                    | : | 6  | 4                             |
| Size of Intake (B x H)            | : | 5m x 5m                                      | 4m x 2.5m                     |
| Gate Type                         | : | Vertical Lift Gate                           | Vertical Lift Gate            |
| Hoisting System                   | : | Rope Drum Hoist                              | Rope Drum Hoist               |
| Trashrack size (B x H)            | : | 5m x 5m                                      | 4m x 2.5m                     |
| Clear opening of trash rack       | : | 32 mm  | 32 mm                         |
| Trash Cleaning Mechanism          | : | TRCM   | Manual                        |
| <u>Gravel Trap</u>                |   |  |                               |
| Type                              | : | RCC Rectangular                              |                               |
| Number of Bays                    | : | 3  |                               |
| Gravel Trap Size (L x B x H, m)   | : | 32 x 8 x 8                                   |                               |
| Size of Flushing Canal (B x H, m) | : | 2 x 2  |                               |
| <u>Connecting Canal</u>           |   |  |                               |
| Size (L x B x H, m)               | : |  | 62 x 4 x 8                    |
| <u>Desander</u>                   |   |  |                               |
| Type                              | : | Dufour                                       | Dufour                        |
| Particle Size to be settled       | : | 0.2 mm                                       | 0.5 mm                        |
| Settling Efficiency               | : | 90 %   | 90 %                          |
| Number of Bays                    | : | 3  | 1                             |
| Dimension (L x B x H, m)          | : | 160 x 30 x 12                                | 80 x 16 x 5                   |

|                                      |   |                              |   |
|--------------------------------------|---|------------------------------|---|
| Inlet Transition Length              | : | 45                           | 15  |
| Flushing system                      | : | Intermittent                 | Intermittent  |
| Size of flushing channel ( B x H, m) | : | 1 x 1                        | 1 x 1   |
| <u>Headrace</u>                      |   |                              |   |
| Type                                 | : | Headrace Tunnel              | Steel Headrace pipe and Headrace Tunnel                 |
| Material                             | : | Concrete and shotcrete lined | Steel Pipe and shotcrete lined                          |
| Length                               | : | 4.78 km                      | 306 m Pipe and 2616 m Tunnel                            |
| Dimension                            | : | 7m dia. Horseshoe            | Pipe: 3m dia. circular<br>Tunnel: 4.05m dia. inverted D |
| <u>Surge Shaft</u>                   |   |                              |   |
| Type                                 | : | Restricted orifice           |   |
| Internal Diameter                    | : | 15 m                         |   |
| Height                               | : | 58m                          |   |
| <u>Penstock /Pressure Shaft</u>      |   |                              |   |
| Type                                 | : | Underground                  | Surface   |
| Material                             | : | Steel lined                  | Steel pipe  |
| Internal Diameter                    | : | 5.75m                        | 3.0m  |
| Length                               | : | 155m                         | 120m  |
| Steel Thickness                      | : | 20 - 36mm                    | 12mm  |
| <u>Powerhouse</u>                    |   |                              |   |
| Type                                 | : | Underground                  |   |
| Size (L x B x H,m )                  | : | 80 x 20 x 29                 |   |
| Overhead hoisting type               | : | EOT Crane                    |   |
| Overhead hoist capacity              | : | 140 Ton                      |   |
| Support type                         | : | Shotcrete and rockbolt       |   |
| <u>Tailrace</u>                      |   |                              |   |

|                                |   |  |  |
|--------------------------------|---|--|--|
| Type                           | : | Underground                                  |  |
| Number                         | : | 1  |  |
| Dimension                      | : | 7.6m dia.<br>Horseshoe                       |  |
| Length                         | : | 270 m  |  |
| <b>7. Turbine</b>              |   |  |  |
| Type                           | : | Vertical axis Francis                        |  |
| Number                         | : | 3  |  |
| Rated Output Capacity per unit | : | 44.00 MW                                     |  |
| Gross Head                     | : | 124.50 m                                     |  |
| Discharge per Unit             | : | 42 m <sup>3</sup> /s                         |  |
| Efficiency                     | : | 92%  |  |
| <b>8. Generator</b>            |   |  |  |
| Type                           | : | Synchronous                                  |  |
| Synchronous Speed              | : | 300 rpm                                      |  |
| Rated Output Capacity per Unit | : | 50.30 MVA                                    |  |
| Power Factor                   | : | 0.85 over-excited                            |  |
| Generation Voltage             | : | 11 kV  |  |
| Frequency                      | : | 50 Hz  |  |
| No of Units                    | : | 3  |  |
| Excitation System              | : | Static with microprocessor based digital AVR |  |
| Efficiency                     | : | 97%  |  |
| <b>9. Transformer</b>          |   |  |  |
| Type                           | : | Indoor type single phase                     |  |
| Rated Capacity                 | : | 17 MVA each                                  |  |
| Voltage Ratio                  | : | 220/√3/11kV                                  |  |
| No of Units                    | : | 10 (including 1 spare)                       |  |
| Vector Group                   | : | Ynd5 solidly earthed                         |  |
| Frequency                      | : | 50 Hz  |  |
| Efficiency                     | : | 99%  |  |
| <b>10. Transmission Line</b>   |   |  |  |
| Voltage Level                  | : | 220 kV double circuit                        |  |

|                             |   |                          |
|-----------------------------|---|--------------------------|
| Length                      | : | 6.3 km                   |
| Conductor Type              | : | 2*BISON                  |
| From                        | : | PH switchyard            |
| To                          | : | Dhungesaghu Substation   |
| <b>11. Power and Energy</b> |   |                          |
| Design Discharge            | : | 129.56 m <sup>3</sup> /s |
| Gross head                  | : | 124.5 m                  |
| Installed Capacity          | : | 128 MW                   |
| Total Energy                | : | 719.11 GWh               |