

DORDI KHOLA HYDROPOWER PROJECT

LAMJUNG, NEPAL



Monthly Progress Report

October 2017



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1 Introduction

Dordi Khola Hydropower Project developed by Himalayan Power Partner Ltd. (HPPL) Kathmandu, Nepal is a Run-of-River type hydroelectric project with generating capacity of 27 MW in Lamjung.

2 Project Schedule

Construction of the project was started from April 2014. Initial completion date was scheduled for June 2017 but due to earthquake, blockade and delay in transmission line RCOD has been extended up to 31 August 2019. However, the construction works are rescheduled to complete by December 2018 and RCOD on 22 March 2019. Contingency plan to evacuate generated power is in process with NEA.

3 Project Features

- Gross Head : 212.0 m
- Design Discharge : 15.28 m³/sec
- Installed Capacity : 27.0 MW
- Total Annual Energy : 148.697GWh
- Total Annual Contract Energy : 142.319GWh
 - Dry Season Energy* : 21.367 GWh
 - Wet Season Energy* : 120.952 GWh
- Power Purchase Agreement (PPA) Rate :
 - Dry Season Energy : 8.40/unit
 - Wet Season Energy : 4.80/unit
- Water Ways
 - Closed Conduit/Steel pipe (Ø2.65m) : 3237 m
 - Headrace Tunnel (Ø3.3m) : 2662 m
 - Penstock Pipe (Ø2.3m) : 700 m
 - Tailrace : 330 m
- Powerhouse Type : Surface
- Turbine Type : Horiz. Francis (3x9 MW)
- Grid Connection Point : Udipur Hub/ Lamjung
- Transmission Line Length : 132 kV Single Circuit
: 1.2 km

4 Progress

4.1 Financial Progress

Facility agreement to provide Term Loan of amount NPR 3,170 million, 75% of total project cost NPR 4,235 million, for construction of the project and working capital of amount 99 million was concluded with Bank Consortium led by Prime Commercial Bank Ltd. on 7 November 2013.

Financial progress up to October 17, 2017 (End of Ashwin 2074) including mobilization advance and advance payment to the contractors is 1,619 million (38.23%).

HPPL has completed the process of IPO after allotting equity shares worth NPR 319.625 million (30% of equity capital NPR1,065 million) to general public including project effected people and company employees in Shrawan 2074. The Equity shares of HPPL have been listed in Nepal Stock Exchange & being trading in Secondary Market.

4.2 Physical Progress

Physical Progress of major contract packages and their status are given in the following table:

S.N.	Name of Contract	Contractor	Award date	Scheduled Completion date	Revised Completion date	Physical Progress up to October 2017
1	Contract Package I: Service Road, Bridge and Land Development	Rasuwa Construction Company Pvt. Ltd.	March 28, 2014	July 03, 2015		Completed
2	Contract Package II: Surface Civil Works	Rasuwa Construction Company Pvt. Ltd.	February 03, 2015	March 02, 2017	June 30, 2018	54 %
3	Contract Package IIA: Hydro-mechanical works	Machhapuchhre Metal and Machinery Works Pvt. Ltd. (Sub-contractor)	February 03, 2015	March 02, 2017	June 30, 2018	62 %
4	Contract Package III: Underground civil Works	Multi Infra Structure Development Co. Pvt. Ltd. (MID)/EIB	January 29, 2015	March 30, 2017	June 30, 2018	32%
5	Contract Package IV: E & M Equipment	Voith Hydro Pvt. Ltd.	April 10, 2015	June 11, 2017	March 15, 2019	69%
Overall Physical Progress Up to October 2017						67%

Surface Works/ Rasuwa Construction Co.

The construction of civil surface works including hydro-mechanical works of the project which includes, headworks, desilting basin, water conductor pipe, penstock pipe, powerhouse, tailrace and switchyard and all related hydro-mechanical works, was awarded to MS Rasuwa Construction Company Pvt. Ltd. in February 2015. Considering the necessity of smooth coordination between civil and hydro-mechanical works, the HM works were included in contract package II along with civil works. The prime contractor Rasuwa Construction Company Pvt. Ltd. has appointed Machhapuchhre Metal and Machinery Works (3MW) as nominated subcontractor, which is doing all the hydro-mechanical works. The access roads/link roads are already constructed connecting to all the components of the project, however, upgrading may require to transport the E&M equipment and maintenance during wet season.

Up to date progress of all the surface civil construction works in respect to the components are explained below:

- **Diversion Weir, Intake and Feeder Pipe**

About 60% of the diversion weir construction was completed till the beginning of the monsoon of 2017. Due to the increase in river discharge, the construction works of the components which basically lies in the river was stopped since July 2017. Now, as the river discharge has reduced, the construction works of the diversion weir has been initiated by diverting river flow from the left bank. The river deposits debris/sand/gravels/boulders etc. are being removed from the already excavated area. A heavy seepage is occurring at the working area and accordingly dewatering management has been done with steps of sand bags and channelization. The excavation of the deposits is still going on.

The concreting of the top slab of the intake structure including embedment parts was being stopped due to the deviation in the design of hoisting arrangement structures. The concreting works will start soon in two stages. The embedment parts will be installed later with second stage concrete.

The feeder pipe alignment civil works has not started because of access road to desilting basin and WCP alignment disturbance. However, a crossing concrete structure at pagi khola has been almost completed.



River Diversion from Left Bank



Cleaning of Debris at downstream of weir



Excavation of Debris deposits



Construction works at top of Intake

- **Desilting Basin**

The construction works of desilting basin started from May 2016. The structure is not in the critical path and hence given less priority than other structure. However, construction of the desilting basin structure is continued even in the wet season. The base part of the structure has completed throughout the length and the structural concreting works up to the top level of slope part is almost completed. The physical progress of the construction of desilting basin is about 70%.



Desilting Basin Construction



- **Water Conductor Pipe & Penstock Pipe Alignment and Valve house**

Rasuwa construction company Pvt. Ltd. (RCC) started the opening of track along the water conductor pipe (WCP) alignment from headworks site to the tunnel inlet portal site soon after mobilization. The length is about 3200 m and the alignment falls under cultivated land, rocky steep cliffs and jungles. All the required land for the structure and access along the pipe alignment has been acquired. Rasuwa has completed the excavation work along the pipe alignment approximate up to the top level of WCP. A trench excavation along the pipe alignment is left which has already started by the nominated subcontractor Machhapuchhre Engineering Pvt. Ltd. (MEPL), a sister company of 3MW. MEPL has started excavating trenches for the buried WCP and laying of pipe has been together started by 3MW. MEPL has excavated trench about 80 m and about 30m pipe has been laid. The installed pipes will be wrapped by coal-tar tape and buried with sand back fill. Sand is being collected and stored for the purpose of buried material. The excavation for the further laying of the pipe is starting together in parallel with the excavation works for the penstock pipe alignment with two separate teams. The construction of valve house

which is situated immediate after the tunnel outlet and beginning of the penstock pipe shall be started only after completion of tunneling works.



WCP Alignment Excavation and installation of pipes



- Power House

The powerhouse structure is situated at the left bank of Marsyangdi River. Foundation excavation and laying of earth mat completed. The Contractor has started concreting works with the installation of embedded parts of hydro-mechanical works and 1st stage embedded parts of Electro-mechanical works. The blinding concreting of powerhouse foundation is completed for all the three units and three anchor blocks entering the powerhouse. The structural concreting of the machine foundation has been raised up to EL. 548 m with first embedded E&M parts for the third unit. Similarly, the concreting work at the tail pool has raised up to the design level, however, the shear wall has been raised up to level 551.0m. The surrounding slopes of the powerhouse is stabilized by shotcreting to prevent from sliding with the appointment of nominated sub-contractor.



Dewatering and debris cleaning at Powerhouse

During the monsoon season due to heavy seepage from Marsyangdi river and periphery of the powerhouse structure, the construction works were stopped since the powerhouse area was inundated. Protection measures were adopted not to direct impact from the flood of Marsyangdi river. Now, the discharge in the Marsyangdi river has reduced and the construction area has already been dewatered. However, the deposited debris is being cleaned with equipment/ manual as per the condition. The concreting work will start soon. For the speed up of the concrete works, a batching plant has already installed and in ready condition. Mixtures and TMs are also ready with the required labors for double shifting work.

Underground Civil Works/Tunnel

Although the surface works progress was impacted by the monsoon season, the excavation works in the tunnels was continued since sufficient stock of construction materials was kept. The geology of both of the tunnel faces are still not so good and the excavation process is going on with steel rib supports. As the rockmass condition at the tunnel face from outlet is improving, the ribs support is being replaced by pattern rock bolts and shotcrete.

- **Excavation from Inlet**

The rock mass condition is still not good even after crossing the major shear zone. The phyllitic rockmass with few quartz veins are appearing with seepage. The tunnel is being advancing by heading and benching method still. However, two blasts are performing usually. The chainage up to the end of October reached is CH 0+267m.

- **Excavation from Outlet**

The rockmass encountering is highly fractured quartzite with seepage water. However patterned rock bolts and shotcrete has been applying for the support system. The advancing of the tunnel is going on with frequently performing two blasts per day. The contractor has maintained the stock of major construction materials and deploying the additional equipment as per necessary. The excavation chainage achieved till the end of October is CH 0+659.75 m.



Inspection of inlet Tunnel face after Heading Blast Outlet Tunnel Face; installing initial supports

Hydro-Mechanical Works

The hydro-mechanical works of contract package II is being conducted by the nominated sub-contractor Machhapuchhre Metal and machinery works pvt. Ltd. (3MW). 3MW has already installed the embedded metallic parts along with gate/stoplog frames at undersluice, Intake, Desilting Basin and Draft Tube at powerhouse. As the civil works were disturbed during the monsoon season, the installation works of pipe and other embedded parts could not be performed. The coal-tar tape has been imported by 3MW for the wrapping of headrace pipe and is being delivered at site. Since the civil works are resuming at the site, hydro-mechanical works will continue in installation of headrace pipe and will start soon the installation of penstock pipe. During the monsoon season, only the fabrication of pipes was performed with painting and different tests. All together about 3500 m pipes including water conductor pipe, feeder Pipe, flushing pipe and penstock pipe has been fabricated.

Electro-Mechanical Works

The electro-mechanical works including supply and installation of equipment was awarded to Voith Hydro Private Ltd. under the contract package IV. Voith has already delivered three units of generator sets, LAVT, NGT panels at the project site. EOT and HOT cranes are being stored at the warehouse in Birgunj. The already conducted FAT of equipment are being dispatched from the manufacturer's factory. Generator Transformer 4 sets, such as 3 units of MIV, 4 units of turbine and 1 unit of PPV, Spiral Casing, switchyard equipment etc. have already been dispatched and waiting for custom clearance at the India border side. Because of the lagging in civil works progress, the equipment dispatched/ delivered are to be stored in intermediate storing yard. The delivered equipment are being stored at the Army yard at Udipur near the powerhouse



area. As per the extended RCOD, a revised construction schedule has been prepared and will be sent to Voith for rescheduling of their manufacturing and service program.

Transmission Line/Power Evacuation

Grid connection agreement with Nepal Electricity Authority was concluded to evacuate the generated power in proposed Udipur Hub by 1.2 km 132 kV single circuit Transmission Line. Construction of Udipur Hub and transmission line along the Marsyangdi Corridor by NEA, is delayed and expected to be completed by 2019 subsequently RCOD has been extended up to 31st August 2017. However, a contingency plan is under way to change grid connection point

from Udipur Hub to Middle Marsyangdi Switchyard at Siudibar to ensure power evacuation, in case, the project is completed earlier.

5 Environmental Mitigation, Social Support and Land Acquisition

- **Environmental mitigation**
- **Geo-environmental Unit** in the project site has been already established to address environmental mitigation works. Bio-engineering and slope stability works are going on along water conductor/service road alignment.



Bio-engineering Works Along WCP alignment

- **Social support**
Social support to local communities in project affected areas such as construction/ improvement of local roads, drinking water schemes, support to community schools, rural electrification etc. are going on under this heading.
- **Land acquisition**
Acquisition of private land for headworks, water conductor (pipe line), penstock pipe and power house almost completed. Ownership title of 215 ropani land has been transferred to HPPL.
- **Government Approval for tree falling and use of forest land**
Approval for tree cutting and use of forest land for construction of surge shaft was granted on April 2017 only. The process for tree cutting for surge shaft is underway.