Second Quarterly Report December 2015 to February 2016 June 2016

BHU: Second Green Power Development Project (118 MW Nikacchu Hydropower Project)

Prepared by the Tangsibji Hydro Energy Limited for the Asian Development Bank.

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Executive Summary

The Environmental Clearance for 118 MW Nikachhu Hydropower Project was accorded on July 01, 2014. With the receipt of clearance pre-construction works including access road construction was awarded in November 2014 followed by water supply arrangement, construction power supply arrangement and contractor construction facilities.

The main package-1 works have not yet been awarded and expected to be awarded after the on-going negotiations. The project is still under pre-construction phase due to which the impact experienced is minimum. THyE has been monitoring all aspects of Environment and Social well being in line with the EMP and RP approved by ADB. No major environmental and social issues were experienced.

The main construction work has not begun, however, implementation of relevant Environment Management Plans and Resettlement Plans have been carried out. Environmental Management Plan (EMP) is based on the analysis of project activity interactions with the baseline features in the project area. The EMP reflects all identified impacts and required mitigation measures, as well as monitoring programs, in conformity with the requirements of the Royal Government of Bhutan, while also being compliant with the Environmental Safeguard Policies of ADB. The Environment Management Plan for following items, during pre-construction phase was proposed:

Land Acquisition (temporary and permanent); Mobilization of equipment; Influx of workers; Fuel storage; Biodiversity and Wildlife management; Solid waste management; Project water supply system; Construction work management; Fisheries development plan; Catchment Management Plan; Transmission line alignment.

Some of the items like mobilization of equipment, influx of workers and fuel storage are not highlighted at this stage since the main contract package has not been awarded. All the management plans that are to be implemented at site werecomplied and some plans such as Biodiversity Management and Catchment Management involving government counter-parts are at the finalization stage.

1.0. Introduction

1.1. Brief Project Description

Tangsibji Hydro Energy Ltd (THyE) fully owned by Druk Green Power Corporation Limited was incorporated, on April 25, 2014, as a Special Purpose Vehicle to develop 118 MW Nikachhu Hydropower Project. The 118 MW Nikachhu Hydro Power Project was identified in the updated Power System Master Plan (PSMP) of Bhutan (2004). The Pre-Feasibility Study (PFS) that was completed on 31 December, 2011 followed by Feasibility Study in September 2012. The Detailed Project Report was completed in September 2013.

Bhutan Consultants & Research (BHUCORE) carried out Environmental and Social Impact Assessment (ESIA) of the Nikachhu project on June 1, 2012, and revisions to the ESIA report have been made by PWC India consultants under the technical assistance of Asian Development Bank (ADB). The report constitutes three parts comprising ESIA, Environment Management Plan (EMP) and Resettlement Plan (RP)

With an estimated energy generation of 491.52 MU, 85 % shall be exported which will not only enable revenue generation for the nation but reduces Green House Gas emission in the neighbouring country by replacement of fuel by clean and renewable energy, hydropower. Further, the outflow of Nikachhu into Mangdechhu reservoir provides additional 323.77 MU to Mangdechhu Hydro Electric Project

Nikachhu Hydropower Project is located in Trongsa and stretches over 25 km from Dam, at Lorim, to Power House, at Norbuodi with 12.14 km Head race Tunnel (HRT) having five intermediated tunnels, ADITs. With the construction of 38 m high dam, 12.28 acres of land will be impounded by 810 m water back-flow.

1.2. Project Progress Status and Implementation Schedule

During this pre-construction stage, infrastructure facilities such as access road of 17.411 km, about 8 km construction power line, water supply arrangement, residential, labour camps and offices were constructed. The detail is as provided below in the Table 1.1.

SI. No	Facility	Details	Status
1	Access road to Dam and Bailey bridge	Contractor: Construction Development Corporation Limited, Thimphu Contract Amount: Construction of 30 m span 24R Bailey Bridge: BTN 14,812,670.43	Road Handed over on 12 ^{fn} November, 2015

Table 1.1 Project Progress Status

		• Construction of 2.10 km Access Road : BTN 34,791,955.00	 ✓ Camp demobilized on
		 ✓ Contract Agreement signed on 15th October, 2014 ✓ Formation cutting started on 28th November, 2014 	f December, 2015
2	Access road to Adit-I	 ✓ Contractor: M/s Gayjur Construction Private Limited, Mongar ✓ Contract Amount: BTN 18,760,650.00 ✓ Letter of award issued on 19th October, 2014 ✓ Contract Agreement signed on 1st November, 2014 ✓ Formation Cutting started on 23rd November, 2014 	Taken over 15 ^m December, 2015.
3	Access road to Adit-II and Adit-III	 ✓ Contractor: M/s Lamnekha Construction Private Limited, Thimphu ✓ Contract Amount: BTN 50,626,000.00 ✓ Letter of award issued on 19th October, 2014 ✓ Contract Agreement signed on 3rd November, 2014 	Road taken over on 2 nd November, 2015
4	Access road to Adit-IV, V, and Surge Shaft	 ✓ Contractor: M/s Gyalcon Infrastructure Private Limited, Thimphu ✓ Contract Amount: BTN 22,678,100.00 ✓ Contract Agreement signed on 1st November, 2014 	Road taken over on 2 nd November, 2015
5	Access road to Power House	 ✓ Contractor: M/s Tshering Construction Private Limited, Bumthang ✓ Contract Amount: BTN 60,158,750.00 ✓ Contract Agreement signed on 1st November, 2014 	Not complete and expected to complete by May, 2016.
6	Water supply arrangement to Dam and Adit I	 ✓ Contractor: M/s TGD Construction, Trongsa ✓ BTN 2,838,862.50 ✓ Letter of Award issued on 27th December, 2014. ✓ Contract Signed on 12th January, 2015 	Completed
7	Water supply arrangement b Adit II,III &IV	 ✓ Contractor: M/s L.S. Construction, Trongsa ✓ Contract Amount: BTN 1,820,936.10 ✓ Letter of Award issued on 27th December, 2014. ✓ Contract Signed on 12th January, 2015 	Completed
8	Water supply arrangement to Adit V, Surge Shaft & Power House	 ✓ Contractor: M/s Karma Tshering Construction, Bumthang ✓ Contract Amount: BTN 3,356,028.78 ✓ Letter of Award issued on 27th December, 2014. ✓ Contract Signed on 12th January, 2015 	Completed

	Contractor	✓	Contractor: M/s Gavjur Construction Private	Not complete and
9	facility at		Limited. Lingmithang	expected to
	Dam, Adit-I	1	Contract Amount: BTN 28,477,299.24	complete in May.
	&Adit-II	✓	Contract Agreement signed on ^{5th} May, 2015	2016
				2010.
	Contractor	1	Work Awarded to M/s 7&K Construction Private	Not complete and
10	facility at		Limited Thimphy on ^{7th} April 2015	expected to
		1	Contract Agreement signed on 22 nd April 2015	complete in May
			Contract Agreement Signed on 22 April, 2010	complete n way,
	V, Surge	¥	Letter of commencement of work issued on 1	2010.
		ľ	Letter of commencement of work issued on 1st	
	Power House		July, 2015	
		, .		
11	Client facility	~	Contractor: M/s Lamnekha Construction Private	Not complete and
	at Dam		Limited, Thimphu	expected to
		✓	Letter of Award: ³¹¹ June, 2015	complete n May,
			Contract Agreement signed on 20 [™] June, 2015	2016.
			Contract Amount: BTN 18,558,838.10	
		✓	Contract Duration: 4.50 months	
	Client facility	✓	Letter of Award: 18 th June, 2015	Not complete and
12	at Power	✓	Contract Agreement signed on 3 rd July, 2015	expected to
	House	✓	Awarded to M/s Gyalcon Infrastructure Private	complete in May,
			Limited, Thimphu	2016.
		✓	Contract Amount: BTN 18,247,704.75	
		✓	Contract Duration: 4.50 months	
	Construction	✓	MoU signed with BPC on 15 August, 2014.	Completed in June.
13	power	✓	Contract duration: 9 months	2015
	arrangement	✓	Completion date: May, 2015	

2.0. Compliance to National Regulations

2.1. Terms and Conditions of Environmental Clearance

	Reference to	Relevant Condition	Compliance
SI.no	Environmental		
	Clearance		
1	Clause 9	The holder shall ensure that the implementation of the proposed project is strictly confined within the allocated area.	Complied.
2	Clause 15	The holder shall ensure that local residents, households, communities, public, private parties and religious, cultural, historical and ecologically important site are not adversely affected by the construction of	Complied, except for the household below the access road of Adit-III, which has been damaged by falling

		proposed project.	rock. However, a new house had been constructed with better facilities and handed over to the owner.
3	Clause 18	The holder shall ensure that the implementation of the proposed project, except the Dam, does not lead to blockage, storage or diversion of river, stream, irrigation channel, waterfall and underground water source.	Complied.
4	Clause 19	The holder shall ensure that a buffer of at-least 100 ft is maintained between the project activities and water streams.	Maintaining buffer from streams were not practical where the road alignment has to cut the water body. However, mitigation measures, for elimination of impact on water, such as causeways, and hume pipes were constructed.
5	Clause 21	The holder shall ensure Biodiversity Management Plan and Compensatory Afforestation Program are implemented in co ordination with the DoFPS to minimize biodiversity impacts.	Compiled. The institutional arrangements are in place but activities not yet underway.
6	Clause 22	The holder shall ensure that the construction works at Adit-II are not carried out from 10 pm to 6 am.	Complied.
7	Clause 24	The holder shall ensure that felling of trees if required are done only upon obtaining approval from DoFPS and as per the conditions of the approval.	Complied.
8	Clause 28	The holder shall ensure that Environment Friendly Road Construction techniques are adopted for construction of access roads.	Complied. Cut and fill method was adopted.
9	Clause 29	The holder shall ensure that the bio engineering practices are adopted on all road side slopes.	Complied.
10	Clause 30	The holder shall ensure construction of side drains, cross drains, causeways, and other supporting structures are required to prevent soil erosion, improve usability and sustainability of road.	Complied.
11	Clause 36	The holder shall ensure that no raw materials of any kind, machineries, plants and equipments and excavated	Not Complied due to space constraint at the access road

		materials are staked along the highway.	side. But made sure no traffic disturbance is occurred due to the activity.
12	Clause 37	The holder shall ensure safe and smooth flow of traffic along the highway.	Complied. However, the bigger impact on traffic is due to undergoing East- West National Highway widening project.
13	Clause 40	The holder shall ensure dusts are suppressed.	Complied.
14	Clause 46	The holder shall ensure that dump sites are stabilized with appropriate protection measures	Complied.
15	Clause 52	The holder shall ensure that waste generated from the labour camps and work sites are managed as required under WPMA of Bhutan.	Complied.
16	Clause 59	The holder shall ensure that safety gadgets are provided to all workers and any person entering the worksite.	Complied.
17	Clause 66	Ensure that signboard are erected at the starting point of the project area	Complied

3.0. Compliance to Environmental Covenants from the ADB Loan Agreement

3.1. Schedule 5 Environment

Table 3.1 Compliance to Environmental Covenants

SI.No	Relevant Condition	Reference	Compliance status
1	The Beneficiary shall ensure, or cause DGPC and THyE to ensure, that the preparation, design, construction, implementation, operation of the Project and all Project facilities comply with (a) all applicable laws and regulations of the Beneficiary relating to environment, health, and safety; (b) the Environmental Safeguards; (c) the ElAs; and (d) all measures and requirements set forth in each EIA and EMP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.	Financing Agreement, Schedule 5 , Paragraph 3	Being complied.
2	The Beneficiary shall ensure, and cause DGPC and THyE to ensure, that(a) there are no measurable adverse impacts on critical habitat that could impair its ability to function; (b) there is no reduction in	Financing Agreement, Schedule 5	Being complied.

	population of any recognized endangered or critically endangered species; and (c) any lesser impacts are mitigated. Without limiting the generality of the foregoing, the Beneficiary shall cause DGPC and THyE to establish a biodiversity management committee acceptable to ADB that (a) shall be responsible for implementation monitoring and evaluation of the biodiversity conservation and biodiversity management plan as outlined in the relevant EMP and (b) shall ensure that the Project facilities are constructed and operated in a manner consistent with the JSW National Park Management Plan		
3	The Beneficiary shall cause DGPC and THyE to (a) assess on a continuous basis, in accordance with the relevant EMP, the minimum environmental water flow requirements during the operation of the Project facilities; and (b) ensure a minimum water flow, at a level acceptable to ADB, so as to minimize downstream impacts and make sure there is no net loss of downstream aquatic biodiversity arising from the operation of hydropower facilities in the Mangdechu river basin, including from the Project facilities and the Mangdechu Hydroelectric project. The Beneficiary shall cause DGPC to establish a funding mechanism or internal resources to ensure integrated water resources management for the Mangdechu river basin, including compliance with the minimum environmental water flow requirements as set out in the preceding sentence	Financing Agreement, Schedule 5 , Paragraph 5	Not relevant at this stage of project phase.
4	The Beneficiary shall ensure, or cause DGPC and THyE to ensure, that all land and all rights-of-way required for the Project, and all Project facilities are made available to the Works contractor in accordance with the schedule agreed under the related Works contract and all land acquisition and resettlement activities are implemented in compliance with (a) all applicable laws and regulations of the Beneficiary relating to land acquisition and indurtay resettlement; (b) the Involuntary Resettlement Safeguards; and (c) all measures and requirements set forth in the RP, and any corrective or preventative actions set forth in a	Financing Agreement, Schedule 5 , Paragraph 6	Complied.
5	Without limiting the application of the Involuntary Resettlement Safeguards, and the RP, the Beneficiary shall ensure or cause DGPC and THyE to ensure that no physical or economic displacement takes place in connection with the Project until (a) compensation and other entitlements have been provided to affected people in accordance with the RP; and (b) a comprehensive income and livelihood restoration program has been established in	Financing Agreement, Schedule 5 , Paragraph 7	Complied.

	accordance with the RP		
6	Submit quarterly Environmental Safeguards Monitoring Reports and semi-annual Involuntary Resettlement Safeguards Monitoring Reports to ADB during construction of the Project annual Environmental Safeguards Monitoring Reports during operation of the Project facilities, and disclose relevant information from such reports to affected persons promptly upon submission;	Financing Agreement, Schedule 5, Paragraph 11, bullet 'a'	Being complied, the 2 ^d quarterly report has been delayed due to ad hoc other matters
7	If any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the relevant EIA, EMP or the RP, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan;	Financing Agreement, Schedule 5, Paragraph 11, bullet <i>f</i> b'	Being complied.
8	No later than 31 March, 2015 engage a panel of experts to monitor and report upon Project implementation, and facilitate the carrying out of any monitoring activities by such panel; and	Financing Agreement, Schedule 5, Paragraph	Complied.
9	Report any actual or potential breach of compliance with the measures and requirements set forth in the relevant EIA, EMP or the RP promptly after becoming aware of the breach.	Financing Agreement, Schedule 5, Paragraph	Being complied.

4.0. Compliance to Environmental Management Plan

4.1. Biodiversity Management Committee

Biodiversity Management Committee (BMC) was constituted for effective implementation of Biodiversity Conservation Programme enlisted in EMP, with the following members:

- 1. Dr. SangayWangchuk, WCD, DoFPS as chairman;
- 2. Mr. Ugyen Tenzin, Chief Forest Officer, Forest Territorial Division, Zhemgang;
- 3. Mr. Phankey Drukpa, Chief Forest Officer, JSWNP;
- 4. Ms. SangayDema, National Biodiversity Center;
- 5. Ms. Rebicca Pradhan, Royal Society for Protection of Nature;
- 6. Mr. Sherab Tenzin, Department of Livestock;
- 7. Mr. Ugyen Tenzin, Dzongkhag Forest Officer, Trongsa;

8 Ms. Thinley, Tangsibji Hydro Energy Limited.

After the constitution of committee, the first committee meeting was held from 2-4 February, 2016. The minutes is attached at Annexure-I.The next meeting is shall be scheduled every after 6 months and intermittently.

4.2. Biodiversity Conservation Programme

A Memorandum of Understanding (MoU) was signed between NBC and THyE for rescue of rare/ endangered species, from Nikachhu project site, on December 08, 2014. Till date survey and rescue was carried out thrice as detailed below:

Survey/Rescue	Date	Remarks	
1 _{st} survey and rescue	February 26-March 06, 2015	Documentation of existing floral diversity of the Nikachu hydropower project sites.	
2nd survey and rescue	April 09- 13, 2015	Rescued 14 species of Orchids.	
3 rd survey and rescue	August 19-30, 2015	18 plant species were collected and rescued.	

Table 4.1 Details of floral survey and rescue

The MoU was signed to augment baseline floral data in the project area and to rescue threatened species, if any, to prevent being destroyed during the main project construction. In December 2015 a hands-on workshop was provided by NBC to forest officials and field officers of various government agencies to impart knowledge on seed collection from wild plants and its long term conservation. Since, then NBC being busy engaged in national priority works could not proceed with their phase of rescue scheduled from December 2015-January 2016.

THyE has approved contribution of Nu. 3.6 millionto Forest Territorial Division, Zhemgang, for Botanical Garden construction atTingtibi during the 15th Board Meeting on October 30, 2015. The Memorandum of Understanding could not be signed till date due to interdepartment issues with the agency. The Department have decided to review EMP budget of Nikachhu Hydropower Project and allocate appropriate amount to various conservation activities relevant to DoFPS.

4.3. Human-Wildlife Conflict Management

Wild boars are the main predator to the crops of farmers. In view of the difficulty faced by the farmer, THyE had discussion with the Geog Administration on electric fencing agriculture lands. During a meeting on October 27, 2015 it was mutually agreed between the Forest Territorial Division, Dzongkhag and Geog Administration that electric fencing system shall be implemented by Department of Forest and Park Services for which Nu.1.5 million was approved. The JSWNP has also proposed for electric fencing at two villages, Kela and Chendebji, falling under park. Since, the same activity in Chendebji area was

covered by the proposal of Zhemgang Forest Division, it was decided during the Biodiversity Committee Meeting that the issue shall be discussed within their department. The whole set of proposal submitted by JSWNP was asked to route through proper channel before submitting directly to THyE. The detail is provided in the Minutes of Meeting with BMC.THyE approved assessing impact of Dam construction on endangered species such as Tiger and Red Panda in JigmeSingyeWangchuk National Park (JSWNP). This shall not only set baseline data but shall also enable THyE and DoFPS to determine actual impact of project on wildlife habitat/movement.

4.4. Augmentation of Baseline Surveys

To augment baseline data of fish survey carried out in 2012, THyE has approved the proposal for aquatic survey by the College of Natural Resource, Lobesa. The proposal covers fish, butterfly and micro-invertebrate survey during the lean season. The preliminary survey and site selection was shall conducted from 27 December, 2015 to 20 January, 2016. The report shall be highlighted with the 3rd Environment quarterly report.

The floral survey covered under project with National Biodiversity Center has also been augmenting the baseline vegetation data. 201 species of plant additional to the baseline was recorded from the project site during the second phase survey. The survey report does not mention presence of any endangered or threatened floral specie.

4.5. Compensatory Afforestation

In the second quarter not much has been done on compensatory afforestaton. Although THyEhas approved contribution of Nu. 7.5 million to Department of Forest and Park Services for compensatory afforestation, due to inter-departmental issue the MoU could not be signed. The MoU shall be singed after thorough discussion within the Department.

4.6. Catchment Management

The EMP requires various catchment management program comprising rapid classification of micro-watershed, assessment of critical micro-watershed and implementation of management plans. To implement the plan, THyE had discussion with Watershed Management Division (WMD) under DoFPS and found out that World Wildlife Fund (WWF) has already signed a project with the Department to carry out catchment management along Nikachhu, which also includes the project area of Nikachhu Hydro Power Project. WMD has been carrying out rapid assessment of watershed along Nikachhu from September 2015. After the completion of watershed assessment three micro-watersheds were found critical by function. Two (Nimdrokhangchhuand Sangchuchhu) are in SehupGeog under WangdueDzonkhag while one (TsheringmaiDrupchhu) is in the Project area. The WMD is preparing management plan for the two micro-watersheds under Sephu and shall not cover TsheringmaiDrupchhu since it does not fall in the area of WWF project. However, during the meeting with WMD and other stakeholders from Forest and health office on 15-16 January, 2016, it was made clear that THyE in collaboration with the Division shall take up management plan preparation and implementation soon after the completion of their current project.

4.7. Panel of Expert

To monitor implementation of EMP an Environmental Expert and Social Development Expert was appointed. They serve as an independent consultant to THyE and back up Environment Unit for any environmental and social issues. The Panel of Experts (PoEs) visited site from February 26-28, 2015 for familiarization of site and from April 19-25, 2015 for consultation and monitoring project sites. The Experts also visited from November 15-22, 2015. Since then THyE did not have much progress on Main Contract Package and no additional infrastructure came up, the visit and monitoring at site by PoEsshall be scheduled only after kick-off of main contract package.

4.8. Aquatic Specialist

National Centre for Riverine and Lake Fisheries (NCRLF), Haa, under the DoL was approved to be appointed as the aquatic specialist to THyE due their expertise and availability of required equipments and man-power. AnMoU was signed between Gross National Happiness Commission (GNHC), DoL and THyE for implementation of 'Conservation and Monitoring of Fishery in Nikachhu' on 24 December, 2015. The team from NCRLF carried out preliminary site selection from 06-17 February. The report is attached as Annexure-II. Four zones were indentified within which stretch the monitoring shall be carried out as give in the picture below:





4.9. Private Land

Most of private lands acquired for project construction are under TsangkhaChiwog. Although only 3.577 acres of private land belonging to 11 households and One Community Primary School were indentified during the project planning stage, five additional households were affected during the actual road construction works as detailed below in Table 5.1 and Table 6.1. :

SI.No.	Name	Plot No.	Location	Area affected (ac)
1	Kinley Zangmo	TAN-1906	Dragitsawa, Tsangkha	0.362
2	TsheringNorbu	TAN-2872	Dragitsawa, Tsangkha	0.196
3	Pelden	TAN-1907	Dragitsawa, Tsangkha	0.362
	Total			0.920

Table 5.1 Additional Affected Persons

A total of 0.920 acres were affected by access road to Adit-V. Consultations with the additional affected household were carried out and meeting done with them in presence of Geog administration to brief them on the type of compensation they are entitled to. Since the access roads are temporary, it was agreed to provide their land on lease for duration of project completion at the rate, Nu.0.1/Sqft/annum, prescribed in the Land Lease Rule of Bhutan, 2009. However, later THyE was approached by the PAPs to increase the lease rate. Therefore, THyE approved a lease rate of Nu.1.0/Sqft/annum taking the baseline from Punatsangchhu HEP and Mangdechhu HEP. The lease agreement was then signed on 18 February, 2016.

While construction of Construction facilities, private lands of two household were also taken on lease as agreed by the owners. The detail is as provided below:

SI. No		Name	Thram No.	Plot No.	Land Name	Land Type	Existing Area (Ac)	Actual Affected Area (Ac)
1	Power House colony	DorjiDema	258	TAN - 1880	Laychu	Kamzhing	0.872	0.268
2	Power House colony	TshewangNorbu		TAN - 1881	Laychu	Kamzhing	0.300	0.300
TOTAL						0.568		

 Table 6.1 Private land for construction facilities

The lease agreement was signed with the two household on 18 February, 2016.

To determine the actual impact of access road construction of private land and also GRFL, Cadastral surveys were carried out from 05-17 October, 2015.THyE after receiving survey reports from Dzongkhag Administration shall process for compensation as per the Land Act of Bhutan and ADB Safeguard Policies.

As identified in the Environment Impact Assessment Report, the 132 kV transmission line shall require acquiring 0.6 acres of private land at Drakten and Langthil. Since the work is scheduled to commence in June 2016, cadastral survey for private land of the indentified six households were carried out from 25-28 January, 2016. The six households are the following:

SL.No	Name	Thram No	Tharm Area	Area Affected (Acre)	Plot No	Type of Land	Tower No.
1	TsheringDema	360	0.624	0.100	DRT 2692	Khamzhing	TL40
2	Tsheringmo	361	1.391	0.100	DRT 2826	Khamzhing	TL41
3	SangayWangdi	689	1.198	0.100	DRT 3110	Khamzhing	TL43
4	DorjiLhamo	280	1.515	0.100	DRT 3304	Khamzhing	TL45
5	Yeshi	1007	0.990	0.100	DRT 733	Khamzhing	TL35
6	Jamtsho	108	1.410	0.100	LNG 296	Kamzhing	TL50

Table 7.1 Private household whose lands are affected

4.10. Government Reserve Forest Land

THyE has leased 195.262 acres of GRF land from the National Land Commission (NLC) with lease agreement signed on May 01, 2015. The leased land does not include access roads which was agreed to be leased only after completion. The cadastral survey carried out from 05-17 October, 2015, also included the GRFL affected by access roads. The report after submission by Dzongkhag shall be processed for lease from NLC.

4.11. Private House

At about 165 meters of access road to Adit-III from the take-off, a house was damaged due to a falling boulder from the access road. However, the mishap occurred only after the completion of all formation cutting of the roads and not during the work. The two storied house belonging to Ms. Karma at TangsibjiChiwog was re-built with facilities better than pre-damage and handed over to the owner in January 2016.



Figure 2.1 Reconstructed affected house

4.12. Community Development Programme

Community Development Programmes (CDP) were enlisted in the Resettlement Plan (RP) in consultation with PAP and Geog and approved by ADB, DGPC and the Royal Government of Bhutan amounting Nu. 16.40million, excluding 10% contingencies. The programme includes blacktopping of Tangsibji Farm road from national highway till NamgayChholing CPS, which has been completed as part of infrastructure work.

Geog Administration has proposed for additional development programme, amounting Nu. 27.00 million which was revised by THyE and was approved in the 15th Board Meeting amounting Nu. 15.15 million. The additional development programmes includes Blacktopping of additional 2.55 km Tangsibji farm road, construction of Temple, study tour for geog officials involved in project service, an ambulance and establishment of Tsogpas' offices.To disburse the approved amount of Nu. 1.4 million for construction of Temple and two vegetable outlets. The blacktopping of additional 2.55 km farm road at Tangsibji was awarded in December 2015 to M/s Bikay Construction and is scheduled to complete by August 2016.

4.13. Income of Affected Persons (APs)

Although there has not been much income to the PAPs directly, their income has increased significantly through increased business such as livestock products, vegetables and, grocery to employee of THyE. Some of the PAPs were also provided with contract cut trees by the contactors of THyE.

4.14. Aesthetics

THyE, with the assistance from contractors, contributed 30 cement bags to Tshangkha Central School to develop Botanical Park in the school campus for aesthetic andeducational purpose. The cements were used for constructing footpaths and flower garden protection.

5.0. Safeguards Monitoring Results and Unanticipated Impacts

All the parameters of Environment Management Plan were complied. Besides THyE, the parameters are also monitored by DoFPS and National Environment Commission (NEC).DoFPS carry out scheduled as well as surprise monitoring while NECcarry out annual monitoring at project site. So far no negative observation has been made by NEC with project implementation.

Unanticipated impacts have not occurred except at Adit-III access road construction. A boulder has damaged a two stored house at TangsibjiHowever, the house has been rebuilt with better facilities and improved condition. Household items were provided to the house owner. The new house has toilet, kitchen and water supply inside the house and also approached with an access road and handed over to the owner.

6.0. Implementation of Grievance Redress Mechanism and Complaints Received from Stakeholders

The Grievance Redress Committee with members from Dzongkhag Administration, THyE and Geog Administration was formed to address Grievance Redress Mechanism. Till date the committee did not receive any complaints from the stakeholders although the community is fully aware of Grievance Redressal Mechanism..

7.0. Conclusion and Recommendations

The project being in pre-construction phase does not have much environmental impact due to Environment Friendly Road Construction Method followed by THyE. The environment aspects are also strictly monitored by Forest Territorial Division and National Environment Commission.

For all social aspects, people do not have any grievance towards the project and indeed happy for the land development cost freedom to choose substitute land provided to them in addition to land replacement. The project has benefited Tangsibji community in terms of development, income (through rents and livestock product) and employment.

Minutes for the meeting of Biodiversity Management Committee constituted for technical support to Tangsibji Hydro Energy Limited (THyE) in terms of Biodiversity Management in the project area of 118 MW Nikachhu Hydropower Project.

Date: 3-4 February, 2016 Venue: Transit Camp/Site Office, THyE, Trashiling, Trongsa

The list of participants is attached as Annexure-I.

Ms. Thinley, Head (Environment Unit), THyE, welcomed all members to the first Biodiversity Management Committee (BMC) meeting after its constitution on 25 November, 2015. She presented on the background, layout, implementation status, EMP requirements and implementation status of 118 MW Nikachhu Hydropower Project. A copy of presentation slides are attached at Annexure-II

The Chairman complemented Ms. Thinley on her presentation stating that it was very clear, professional and well presented.

The following discussions were held and recommendation made by BMC:

- 1. The BMC recommended that the Project Management should ensure all stakeholders/agencies proposing for financial and institutional support from THyE follow proper channel and government protocol. This includes activities being carried out by NBC, DoL, DoFPS etc.
- 2. The modalities of the proposal submission and approval were discussed in detail. Recognizing that there are many activities for the Department of forest to undertake for conservation or afforestation, and keeping in mind that the project is time bound, a focal person by DoFPS shall be nominated to ensure that all proposals, budget requisition and approvals are submitted through proper channels through the Department and GNHC to ensure smooth and expeditious implementation of the approved proposals.
- 3. The Committee reviewed and finalized the draft ToR for BMC. The final ToR is attached as Annexure-III.
- 4. The Committee recommended changing the title of the Committee to reflect its technical and overall mandate. The BMC was re-named 'Technical Committee for Biodiversity and Environment Management'.
- 5. The Committee being a technical one in its mandate, clarification was sought to THyE whether the decisions of the committee are legally binding. THyE shall take the discussion to its management.
- 6. The Committee asked respective CFOs of Park and Territorial Division to review utilization of EMP budget and identify gaps in the implementation of EMP.
- 7. The current membership of the Committee was reviewed and recommended that the present members represent all stakeholders and that there is no need to add any new members. However, the CFOs of Wangdue and WCNP would be invited as and when required since some of the activities of EMP will be implemented in their jurisdiction

- 8. The Committee reviewed the requirement of establishing Catchment Management Committee (CMC) within the area covered in the EMP. However, it was felt that CMC was not required as the mandates of BMC could cover CMC's mandates and moreover, the members representing the government will be same. Therefore, Committee recommended that a member from WMD, DoFPS, be added to the BMC.
- 9. The Committee agreed to have bi-annual meetings to review the financial and physical progress of implementation of EMP and project supported activities. The Committee shall also meet if there are urgent issues/proposals submitted in between the two meetings.
- 10. It was agreed that the tenure of the Chairperson shall be 2 years and the other members shall be institutional and continue till the end of the project period.
- 11. The Committee recommended that THyE shall come up with list of stakeholders and circulate among the members.
- 12 To augment database, the committee recommended that all stakeholder should share data generated within the project area in the process of implementing EMP with THyE.
- 13. BMC reviewed the proposal submitted by JSWNP and following were recommended:
- a. Since there is overlap in area (Chendebji) with same activity between Forest Territorial Division, Zhemgang and JSWNP with an approved budget of Nu. 1.5 million, the committee recommended that the two stakeholders should work out on the modalities of implementing the activity.
- b. For Tiger and prey-base monitoring: Nu. 0.95 million
- c. Human wildlife conflict- rescue operation of wildlife: 0.9 million
- d. Institutional support and capacity building: 0. 9 million
- e. The proponent of the proposal shall route the request through established channels.
- 14. Establishment of regional Wildlife Rescue and Rehabilitation Center: The Committee was requested by representatives of DoFPS for supporting establishment of a Regional Wildlife Rescue and Rehabilitation Center within Trongsa Dzongkhag. The Committee reviewed the request and recommended for consideration for the following reason:
- a. The EMP requires implementing wildlife conservation program including wildlife rescue and release.
- b. Since, wildlife movement is not just confined to the project sites the BMC recommended for co-financing from MHEP and BPC.
- c. The DoFPS will prepare the proposal and submit to concern agencies for financial support.

- 15. For TA/DA submissions by the agencies to the THyE it was agreed that no direct TA/DA claims by forestry staff will be entertained by THyE unless they are submitted after verification and endorsement by the CFOs.
- **16.** Any other matters
- a. CFO of JSWNP requested if the DoFPS could write to THyE management regarding the proposals recommended by the Committee for an indicative figure. This would enhance completing the required procedures for obtaining final approval.
- b. Date and Venue: to be circulated later to Committee members by THyE. The meeting winded up with closing remarks from the Chairperson.



Royal Government of Bhutan

Department of Livestock Ministry of Agriculture and Forest



National Research Center for Riverine and Lake Fisheries

A Report on Pre- Feasibility Study of Tangsibji Hydro Energy Limited (THyE) in Nikachu, Trongsa Dzongkhag



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1 Introduction

The Tansibji Hydro Energy Limited (THyE) for Nikachu, Trongsa, a Pre- Feasibility Study Report, is foremost stage to deliver working effort afore the baseline fishery study. This study will guide to conduct a real time sampling in Nikachu (for Aquatic flora and fauna assessment). Site selection is carried out mainly to aid the sampling team in term of accessibility like road and human passage during sampling period. This was mainly to prepare with better eq**uipment's** and gears for operation in the field. Every stretch of the water body may be different in terms of its physiology and geography and needs to be perform accordingly. This will guide the team to develop accurate field protocol to generate correct results.

The upstream and downstream of Dam site is need to be study well to collect field information such as geography, accessibility, start point and end point for sampling. This information will be helpful for site selection during the baseline study period. Among other technical details, the preliminary site selection conducted in the Nikachu is aimed at to assist the following purpose/objectives:

- To identify potential sampling stations/areas
- To assess river physiology (fast flowing, shallow or deep)
- Risk assessment (safety measures to be employed later on)
- To assess site accessibility and geography location
- Detail survey and data collection



2 Methodology

2.1 Sampling site

Study sites were selected according to zone and station developed to represent even distribution of sample area in Google Map (Desktop assessment). Samplings sites were selected as per the plan in Nikachu and Mangdechu. The GPS coordinates were recorded in all sampling sites to provide fish composition and distribution as shown in (Fig.1).

2.1.1 Upstream of the Dam

Two Zone of 1 km each of Nikachu will be selected for sampling in upstream of the dam site. The main reason to study the upstream of the dam site is to ensure the fish movement/migratory pattern and water quality as shown in (Fig 1).

2.1.2 Downstream of the Dam

From downstream two zone of 5 km each of Nikachu and five station from Mangdechu will be samples as given (Fig.1). The main reason to study the downstream of the dam site is before the construction it is important to collected data on quality of water and fish **movement/migratory pattern, habitat and other macro invertebrate's existent.** After construction there will be disrupt and alter of water flows that make completely dewatering river reaches and the life contain, which will be unravel the ecological web of a river system. This will act as significant database before to assure after construction on aquatic flora and fauna.





3 Factor to Consider during pre-feasibility period

Factors such as site accessibility, river physiology and topography, report on fish present in different sites and local interaction were all taken into account for making the selection. The following methods were used for collecting this information like physical survey and local interaction with local people.

3.1 Physical survey

31.1 Accessibility

Accessibility was an important factor to be consider while selecting sampling zones and stations. The team ensured that every station selected was accessible to road or within walking distance from the road point. Inaccessible sites especially those with no proper road or covered with thick vegetation were avoided and also high cliff area where human cannot pass through.

3.1.2 River Physiology

Another important factor the team observed was the river physiology. All the fishing gears cannot be placed in all selected station due to river physiology and topography of the sites. The sampling team would require enough working space along the bank of river with station marked. This includes of carrying of sampling equipment's and gears such as fish holding bucket, measuring scale, weighing balance, digital camera. Stations with acceptable flow and sufficient bank space (de-watered area along the river bank) were preferably selected.

3.1.3 Pre - Sampling methods

The team also conducted pre-sampling in selected areas to assess the existing of samples (fishes) and mainly to provide basic conclusion in the sites. During the pre-sampling period the team were using elector fisher, cast net and rod and line. For water testing pH and

Dissolved Oxygen (DO) meter were used.

4 Result/ Observation

Based on above methods the team completely conducted a full assessment of Nikachu and Mangdechu (physical and social). The study results are:

4.1 Physical Survey and field observation in Nikachu

Site assessments in Nikachu and Mangdechu was conducted within 11 days of assessment period. The Nikachu flow below the Highway and divert downward from ADIT 1and join Mangdechu.

- Upstream was found slightly accessible for sampling and identify for hydrology data collection.
- Downstream ADIT 1 to Dam site was found accessible in some point only and identify for hydrology data collection.
- ADIT 2 to ADIT 1 were found limited access to sampling due to narrow bank with fast flowing river and dense vegetation cover. The team not able to move through landscape with High cliff area to reached down to river start point.
- ADIT 3 to ADIT 2 were found limited access to sampling with depth pool and fast flowing water and dense vegetation cover and high cliff area.
- Mangdechu and Nikachu Confluence were found partial access to fishing but not access to collect the hydrology data due to shallow and fast following with huge rock.



Figure 2 Limited accessibility in ADIT 3 to ADIT 2

4.2 Physical Survey and field observation in Mangdechu

Site assessments in Mangdechu was conducted. The Mangdechu pass through the highway.

- Upstream of Mangdechu is found not accessibility due to rock and high cliff area.
- Small portion of sample area is identify in dam site.
- Above the power house of the Mangdechu sample area were identified and marked for data collection.



Figure 3 Site selection in Mangdechu and river physiology

4.3 Local interaction

The following information was gathered by interaction with people from different places where the team across through.

- Illegal Fishing was not practice in area.
- No idea of fish species present in the river by local people.
- Illegal fishing is done by construction worker but they are refuse to answer the question.

5 Sampling area identified in Nikachu and Mangdechu

5.1 Upstream of the Dam

As per plan in desktop assessment the real sampling area and sites were selected. Two zone of 1 km each of Nikachu were marked with GPS coordinates with one sample station each as shown (Table 1). The main reason the team cannot select the more sample site was due to topography and river physiology in sample area like human cannot pass due to huge rock and cliffy area and the team need to climb up and down, the river is depth, shallow and fast flowing this lead to deprived for selecting sites.

Zone	Station Northing Easting		Altitude(M) Total KM Stret		ch Remarks
Ι	Ι	27.45079 90.36884	2170	0.53	Upstream
II	Ι	27.42379 90.64230	2147	0.80	

5.2 Downstream of the Dam

From downstream two zone of 5 km each of Nikachu were selected with two sample station each marked as given (Table 2). ADIT 3 to ADIT 2 were found not access for sampling with limited area with shallow, depth with high cliff and thick vegetation cover to reached river site.

Zone	Station	Northing Easting	Altitude(M) KM Stretch Remarks		
	ADIT 1	27.44737 90.39435	2074	2.16	Downstream
III	ADIT 2	27.44460 90.30568	2002	2.88	
	ADIT 3	27.43282 90.44937	1478	4.50	
IV	Confluenc	e 27.43326 90.46263	1403	1.50	

5.3 Mangdechu Sample station

Five station from Mangdechu were marked as given (Table .2). While the station were identified as per pre-fixed markings, the stations were selected carefully through study and base on above criteria.

Station	Northing	Easting	Altitude(M)	Remarks
Ι	27.37057	90.53360	1075	Downstream
II	27.39466	90.50929	1149	
III	27.4378	90.46453	1434	
IV	27.48532	90.49249	1623	

 Table 3 Mangdechu selected sample station and marked

6 Water parameter study

During the pre-feasibility study stage the water parameter were tested in Nikachu and Mangdechu as given in (Table 4).

Sample site	Temperature (C)	Dissolved Oxygen(DO)	рН	
Nikachu	7.5	10.6	8.0	
Mangdechu	7.2	10.9	8.1	

Table 4 Water parameter tested in Nikachu and Mangdechu

7 Pre - Sampling result

During the pre-feasibility the team run-through the pre-sampling in Nikachu and caught Brown Trout merely by using electro fisher and rod and line but zero caught in Mangdechu. Through visual observation the feeding mark of snow trout has seen in Mangdechu. The macro invertebrate was also study and the most macro invertebrate found were Plecoptera larvae, Megaloptera larvae, and Diptera larva as shown in (Fig.4 & 5).



Figure 4 Fishing gear used during pre-sampling time



Figure 5 Pre- Sampling fish and macro invertebrates

Annexure 1 Tools used during pre-feasibility study Cast Net - 2nos Rod and line (Angling) - 1 no Scope net/ Kick net/Hapa net - 3nos each Fish Measuring scale- 1no DO meter- 1no Bucket _ 2 nos Digital Camera- 1no Electro Fisher- 1 sets Specimen jar- 10nos Formalin- 3bottles Cool box- 1nos GPS-1 no Sampling bottle- 5nos Rope _ 100 meters -2nos Wader-1 no Plastic-10 nos



Annexure 2 Photo of Dam site showing river physiology of upstream with station

Dam site and upstream site

Annexure 3 Photo showing Adit 1 to Damsite



Annexure 4 ADIT 2 to ADIT 1



Annexure 5 ADIT 3 to ADIT 2 limited area to move through



Annexure 6 Mangdechu and Nikachu Confluence

