

Forest loss Mapping for 132 kV DC Transmission Line

118 MW Nikachhu Hydropower Project

Assessment Date: July 1, 2021 – August 21, 2021




Location: Drakteng & Langthel Gewog		
Date:	August 21, 2021	
Prepared by:	Tangsibji Hydro Energy Limited	

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Acronyms

ADB	Asian Development Bank
BPC	Bhutan Power Corporation
DC	Direct Current
DoFPS	Department of Forest & Park Services
EIA	Environment Impact Assessment
Km	Kilometer
Ha	Hectors
LULC	Land Use Land Cover
MW	Mega Watt
MHPA	Mangdechhu Hydro Power Authority
MoU	Memorandum of Understanding
NHPP	Nikachhu Hydropower Project
RoW	Right of Way
SPS	Safeguard Policy Statement
THyE	Tangsibji Hydro Energy

Executive Summary

The 132 kV DC transmission line with 18.6 km in length will evacuate the generated power from the pothead yard of Power house, 118 MW NHPP to Pothead yard of MHPA in Yurmung.

During the Environment Impact Assessment, vegetation study was carried out using random plot sampling covering types of trees, middle vegetation and ground vegetation along the transmission line. Accordingly, classifying of the vegetation was categorized and the expected forest to be cleared was assumed to be 100 acres. From the 18.6 kilometers 3 km was found in the shrub forest.

With completion of the construction work for the 132 kV transmission, the compensatory afforestation program for the 132 kV transmission line is required to be initiated in collaboration with the Department of Forest and Park Services. Prior to implementing the afforestation program, the need for assessment for actual forest cleared along the 132 kV transmission line was required. As per the current practice and norms of plantation especially for Hydropower Project double the deforested area are required to be covered under compensatory afforestation program.

In this regard, a small assessment was carried out in July to August month of 2021 along the 132 kV transmission line. Initially buffer was created along the right of way wherein Land Use Land Cover Map of 2016 was overlaid in Qgis. This was mainly done to determine vegetation classification along the 132 kV transmission. However, it was observed that due to the slope aspect, distribution of crown cover of the trees, existence of the built up area by MHPA, National Highway and crossing of the 33 kV transmission line, further assessment was carried out. After detail mapping along the transmission line, only 33.25 ha of forested area was cleared by the transmission line.

This report covers a simple method adopted to ascertain the actual forest area cleared by the 132 kV transmission line.

1 Introduction

118 MW NHPP is located in Tangsibji Gewog under Trongsa Dzongkhag. The power generated from 118 MW NHPP will be evacuated through 18.6 km to pothead yard of MHPA. As per the requirement of the National Regulation and Asian Development Bank SPS, the EIA for the 132 kV DC transmission line was originally prepared in 2012 by the Bhutan Consultants and Research (BHUCORE). The EIA was later revised on May 2014 with inputs incorporated after stakeholder consultation. The EIA covers two parts: Part-I for the Main project and Part-II for the 132 kV DC transmission line.

Tangsibji Hydro Energy Limited being a subsidiary company of Druk Green Power Corporation is an implementing agency to ensure that the project environmental and social measure fulfills the requirements of the national regulations and ADB SPS. For the construction of the 132 kV transmission line, the work was awarded to the BPC as deposit work. With signing of the MoU with the BPC in 2014, the actual work began in 2017.

During the construction stage, few numbers of the tower was relocated due to technical reasons and also to avoid impact on private property. Originally four households were affected. Later with relocation of the tower, additional seven households were affected. All the affected households are provided with compensation as per the entitlement matrix reflected in the Resettlement Plan.

For the vegetation loss, expected area considered during EIA was 100 acres. With completion of the construction work for the 132 kV DC transmission line, it was observed that sudden section of the right of way crosses over existing built up area, 33 kV transmission line, non-requirement of clearing of the vegetation at some section due to presence of shrubs and barren land underneath the RoW.

In this matter, further assessment was required to ascertain the actual deforested area. This assessment was carried out with reference to definition of the forest given below:

1. Forest and Nature Conservation Rule, Bhutan (2017), forest is a land with tree spanning more than 0.5 ha with tree higher than 5 meter and a canopy more than 10 percent.
2. Forest Resource Assessment (2010), Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.

1.1 Project location

The 132 kV DC transmission line has 54 tower footings and they partly falls in Nubi Gewog, Langthel Gewog and major parts falls in Drakteng Gewog. The 132 kV transmission line requires to maintain 27.00 meters of right of way with minimum ground clearance of 6 meters. During the construction state, temporary access road at 15 location has been made.

The dominant vegetation was broadleaf forest followed by shrub, herbs and also barren land was observed along the RoW. The transmission line span length starts from AP 1 located south east direction from power house of 118 MW NHPP and with tower AP 51 conjoining at pothead yard of power house of MHPA, the power will be evacuated together with 400 kV transmission line of MHPA.

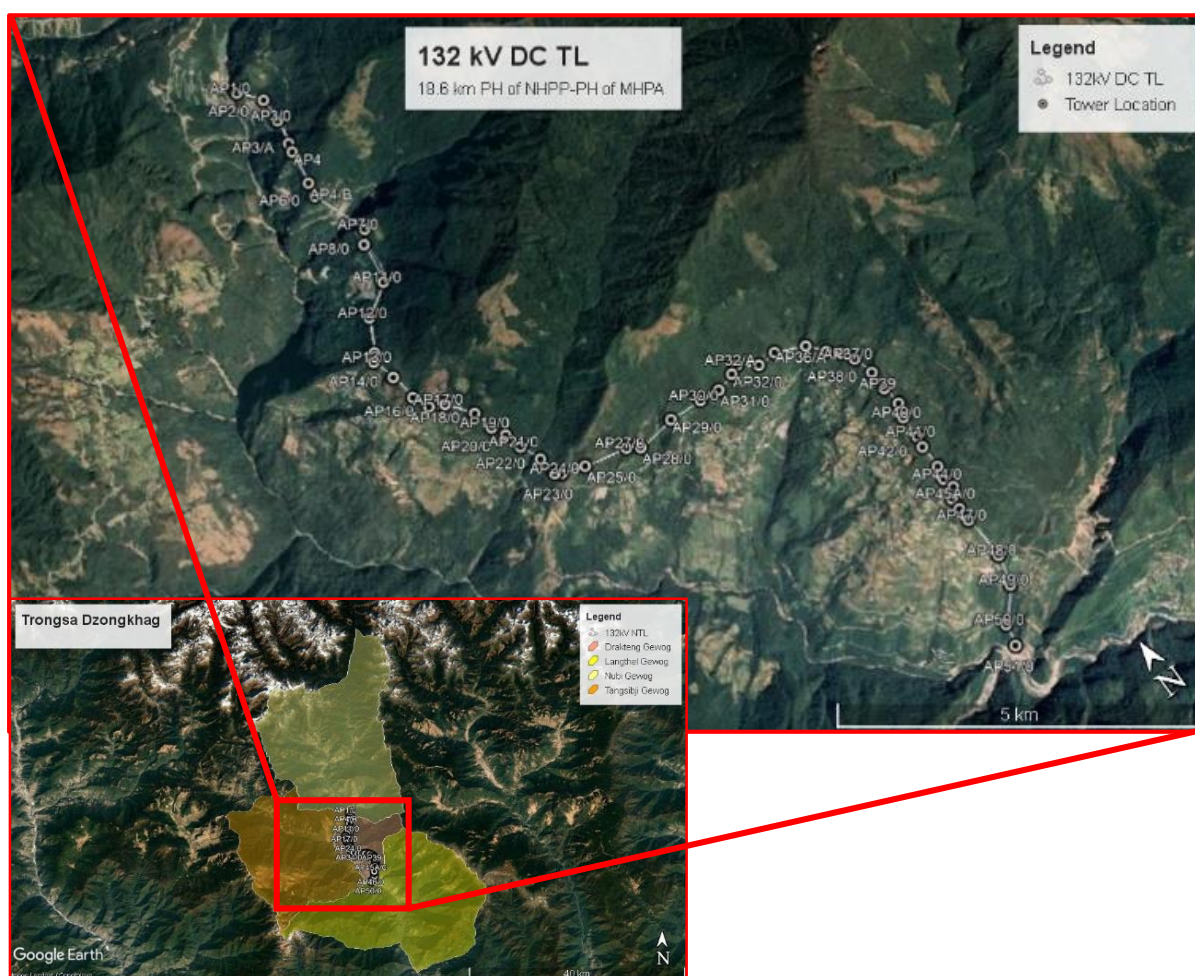


Figure 1: Project Location

2 Materials & Methods

2.1 Data & Software

The main data and software used in this study are:

- Coordinates of the tower footings,
- Land Use Land Cover Map 2016 prepared by DoFPS,
- Historical Imagery of Google earth,
- Software: QGIS & Google Earth Pro.

2.2 Methodology

Coordinates of the tower footings were imported into QGIS and line was plotted to simulate transmission line. Then using buffer function in QGIS, 27 m right of way (RoW) was calculated for transmission line. Then RoW was overlaid on the Land Use Land Cover (LULC) Map to calculate various land use and cover along the transmission line as shown in Figure 2. Then the initial verification of land use and land cover affected by RoW of transmission line was carried out using Google Earth historical imagery of 2006, 2010, 2014, 2017 and 2020.

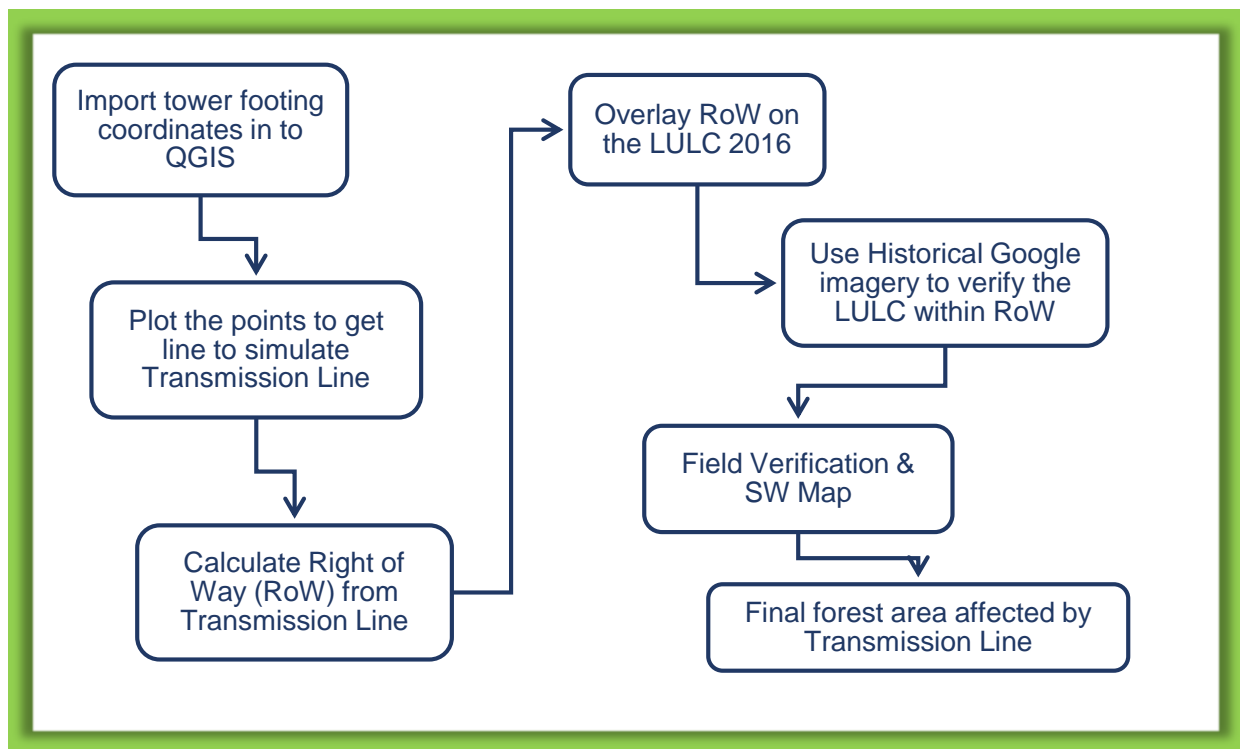


Figure 2: Forest Loss Mapping flow chart

During the image analysis, land use and land cover affected by the RoW of transmission line was also categorized in disturbed and forest area, which was manually verified by delineating from historical Google imagery.

Finally to ascertain the actual impact, field visit from tower to tower location was also carried out as part of field verification work. This was also further done with comparative physical verification carried out with the structure and the existing surrounding land.

3 Results

Based on the imagery analysis and with field verification, majority of the land cover along the RoW of the transmission line was broadleaf forest, then followed by built up area, shrubs and wet land or private lands.

It was observed that the tower location AP 14, AP 15, AP 16, AP 17 and AP 32-AP 48 falls in shrub land. From AP 1-AP 2, AP 6 - AP 7, AP 13-AP 18, AP 47 -AP 48 the RoW was crossing over existing built up area by MHPA, 33 kV transmission line and highway.

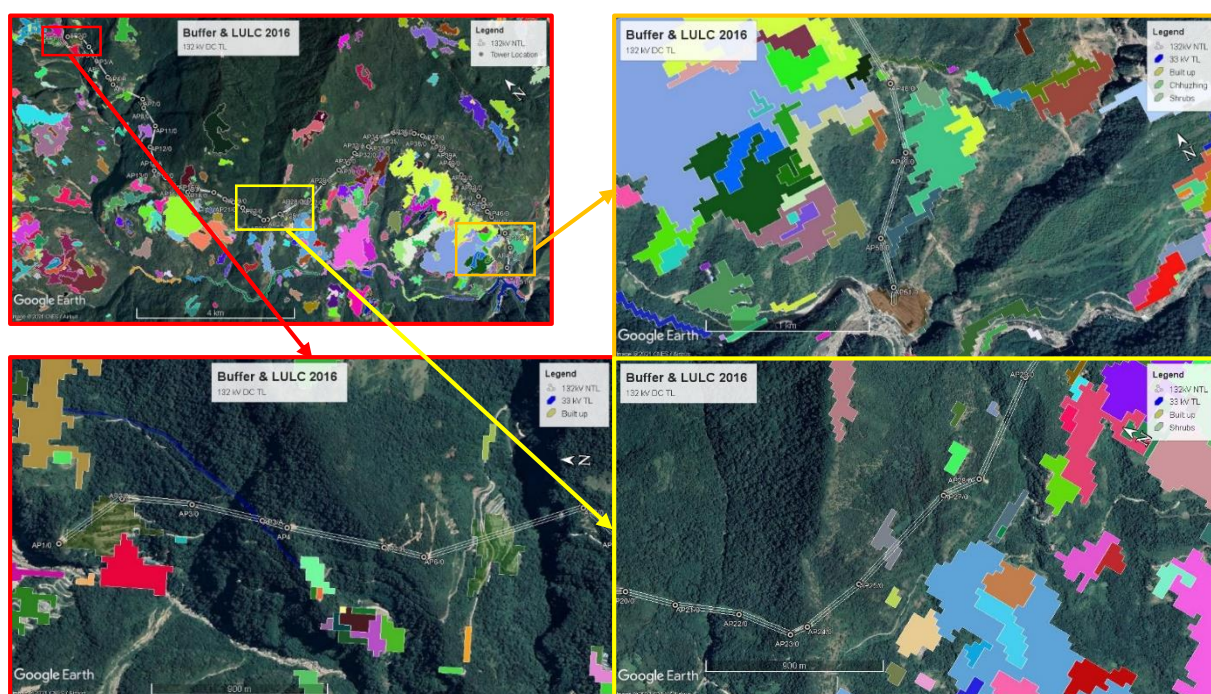


Figure 3: Land Use Classification along 132 kV DC transmission line

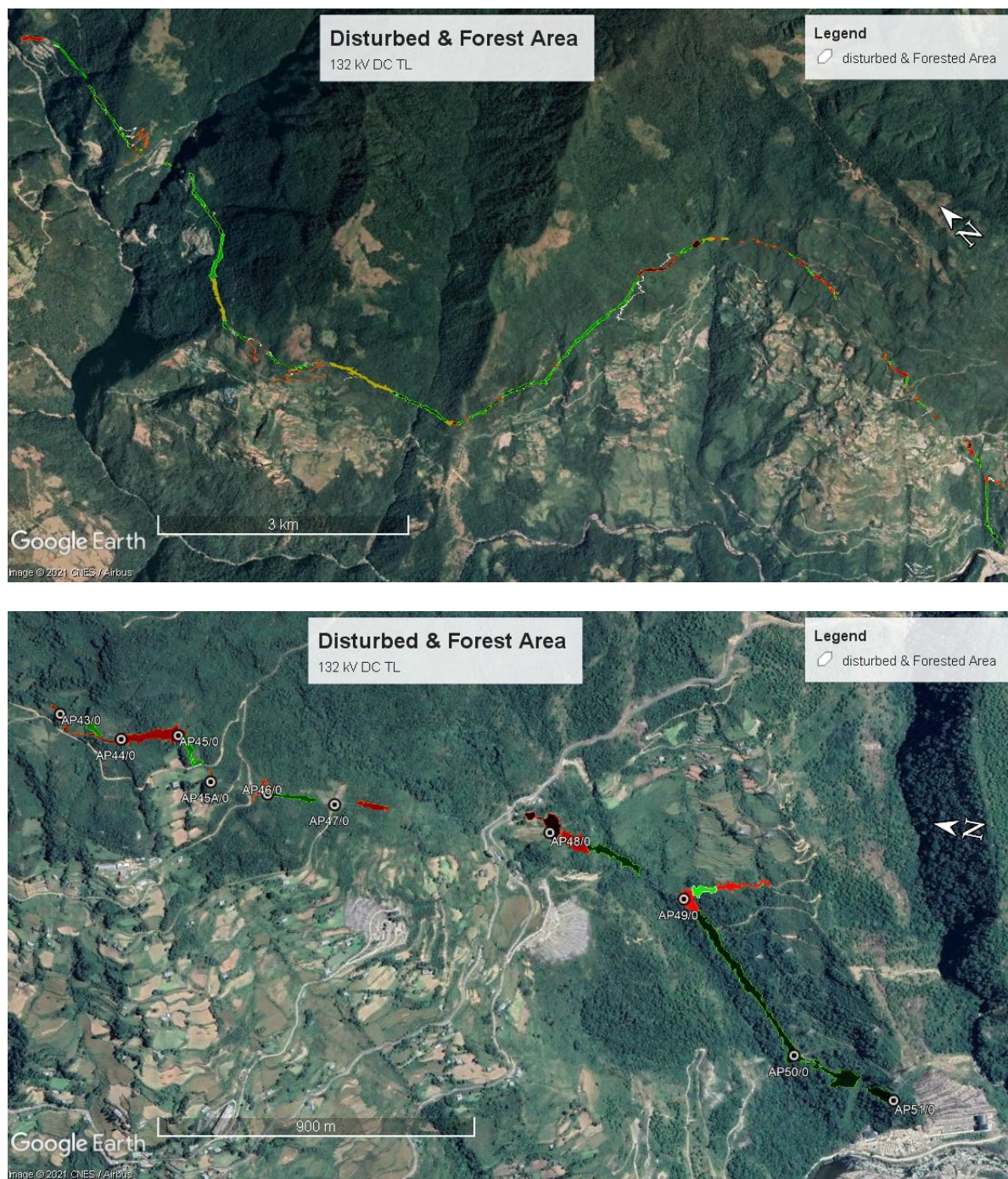


Figure 4: Delineated area for disturbed and Forest area along the Transmission Line

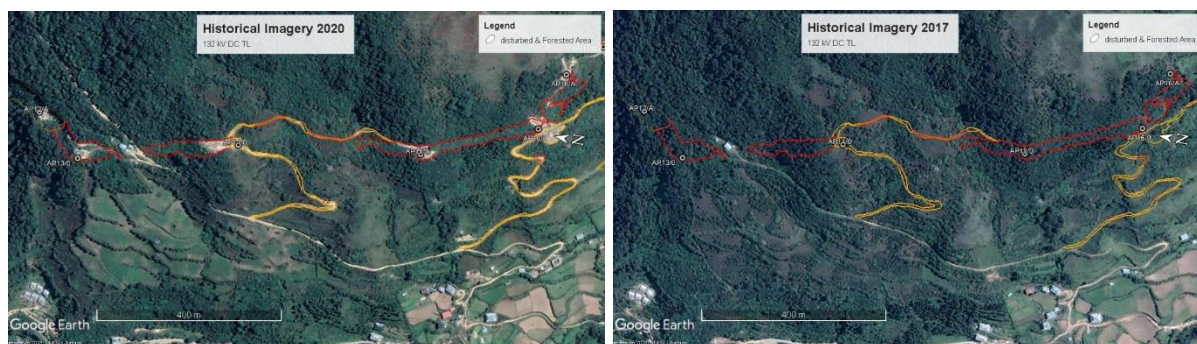


Figure 5: Comparative historical image in Google Earth (2017 & 2020)

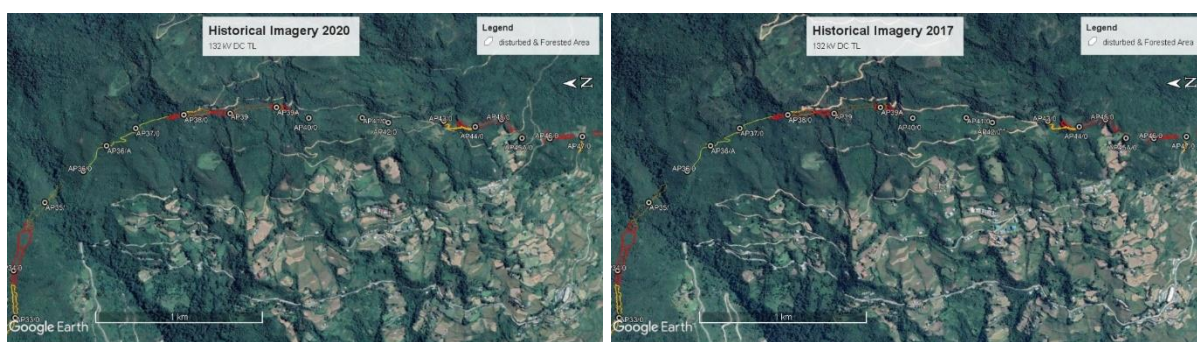


Figure 6: Non-Disturbed area along 132 kV DC transmission line

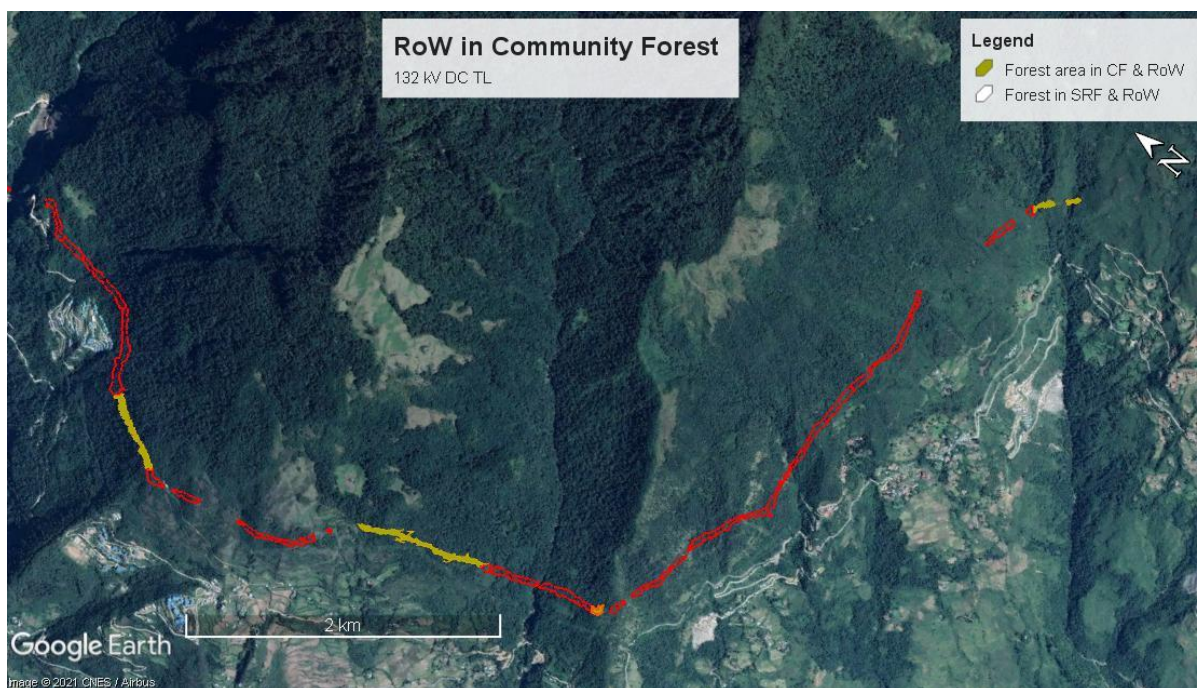


Figure 7: Forest area cleared by RoW in Community Forest area

Table 1: Total deforested area along 132 kV transmission line

Sl. No.	Description	Total (ha)
1	Forest area cleared by RoW in SRL	26.26
2	Forest area cleared by RoW in CF	5.7
3	Forest area cleared by access road	1.29
	Total area (Ha)	33.25
4	Total Disturbed area	8.82

The total forest cleared by the RoW and temporary access road was 33.25 ha wherein the total disturbed area was 8.82 ha. As envisaged in EIA, the forest density was high at AP 1-AP 13, AP 18-AP 32 and then the density decreases as it moves toward AP 51. During the construction of 132 kV transmission line, machine marching was carried out in 15 access points. However, the impact was significant low on vegetation clearing as majority of the machine marching was carried out along RoW. It was also observed that access roads was extended from the existing farm roads in small pockets. From AP 32-AP 48, the RoW runs through shrubs and minimal vegetation was cleared along these section.

4 Conclusion

Originally the expected deforested area considered in EIA was 40.46 (100 acres) hectares. However, with current assessment, it was observed that only 33.25 (82.16 acres) ha has been cleared.

For the afforestation program, only 28.5 (70.42 acres) ha may be considered as compensation for the vegetation clearing along the CF of Taktse and Eusa has been already completed on July 13, 2020.

5 Appendix

5.1 Supporting Pictures



Picture 1: Built up area between AP 6-AP 7 at Dzongkhalum crossing



Picture 2: Built up area between AP 13-AP 14 at Taktse



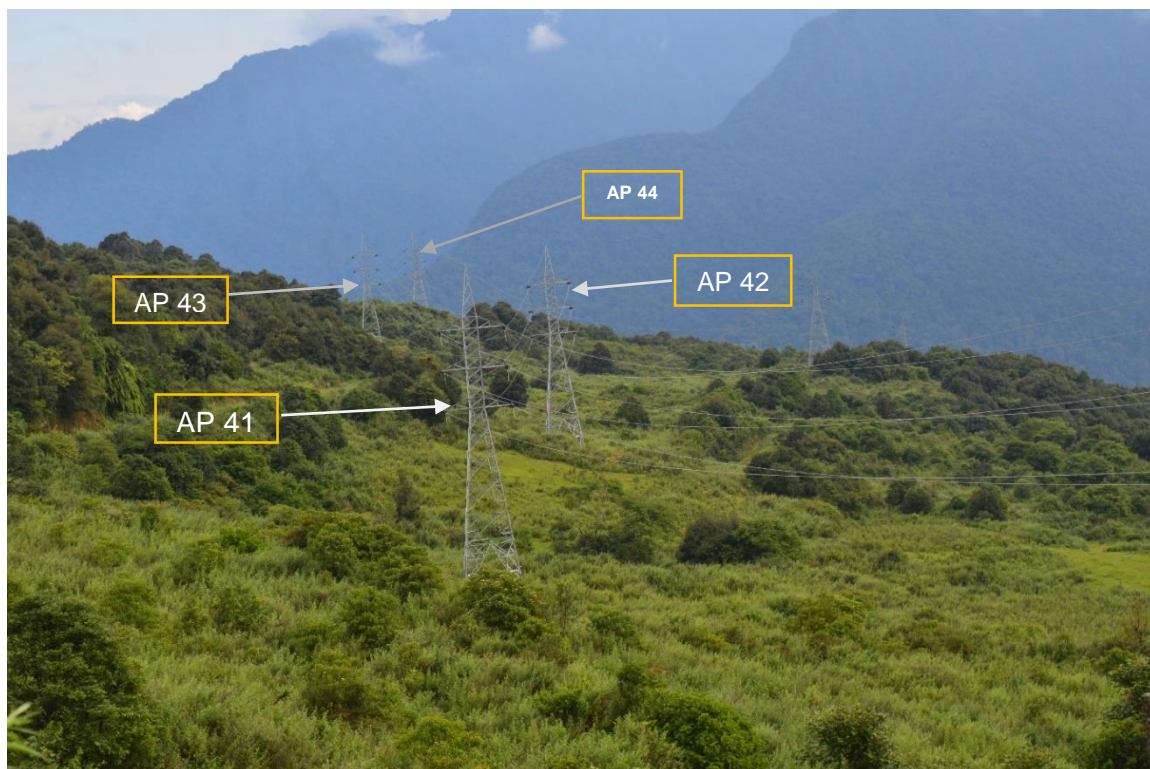
Picture 3: AP 14 and vegetation below the RoW at Taktse



Picture 4: AP 17-AP 18 RoW in Eusa Community Forest



Picture 5: Vegetation between AP 36-AP 35



Picture 6: Shrubs along the RoW of AP 41, AP 42, PA 43 & AP 44 Samcholing




Picture 7: Shrubs below the Row of AP 47 at Samcholing



Picture 8: Vegetation and Chuzing under RoW of AP 48-AP 49 at Yurmung

6 Supporting Documents


6.1 Compensation raised by Trongsa Range on behalf of the CF members



དཔལ་ལྷན་འབྲུག་གཞུང་། སོ་ནམ་དང་ནགས་ཚལ་ལྷན་ཁག།

ནགས་ཚལ་དང་སྒྲིང་ཀ་ཞབས་ཏྲུག་ལས་ཁུངས།

Divisional Forest Office: Bumthang
Forest Range Office: Trongsa



TR/SFES/44/2019-2020/ 330

The Sr. Project Manager,
Project Office,
BPCL
Dangdung, Langthel Gewog

Dated: May 19, 2020

Subject: Compensation Details on Damage caused to the Forest Resources in Approved Community Forest in Drakteng Gewog during Construction of 132 Kv DC Transmission Line for 118 MW.

Dasho,

As per the conditions of Forestry Clearance vide No. BFD/CPS-T/26/2018-2019/6010, dated 25th April 2019, the Forest Range Office, Trongsa would like to raise a claim on behalf of Community Forest Management Group members of Eusa Barpo and Taktse Community Forest, Drakteng Gewog regarding a damage caused to the Resources of their Community Forests due to the Construction of 132 Kv DC Transmission Line from Power House of Nikachu Project.

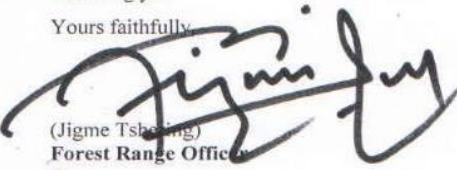
During joint verification and assessment with official from BPCL, CDCL and representative of Community Forests, this office has verified and marked 670 Nos of trees falling along the RoW to be removed and disposed for the construction of said activity. The main species found to be removed along the RoW are *Oak species*, *few Walnut*, *Symplocos sp*, *Alnus nepalensis*, *Acer sp*, *Carpinus sp*, *Persea sp*, *Cinnamomom sp* and other broad leaved trees which are covered under Special, A and B class timber. Base on the minutes of meeting convened on 2nd November, 2018, this office had calculated the compensation by realizing the commercial rate of royalty on standing tree basis under each classified girth of Forests and Nature Conservation Rules and Regulations of Bhutan, 2017

The following are abstract of Royalty Compensation against Forest Resources damaged calculated in Eusa Barpo and Taktse Community Forests;

Sl. No	Name of Community Forests	Gewog	Total Nos of Tree	Compensation Amount	Remarks
1	Eusa Barpo Community Forest	Drakteng	372 Nos	37712.00	
2	Taktse Community Forest	Drakteng	298 Nos	80700.00	
	Total		670 Nos	118412.00	

With this, Office would like to forward the Compensation Statement (attached) amounting Nu. **1,18,412.00** (One Lakhs Eighteen Thousand Four Hundred and Twelve) only to your good self for necessary action on the matter and kindly intimate if any clarification from the undersigned office.

Thanking you
Yours faithfully,



(Jigme Tshering)
Forest Range Office

Cc:

1. Managing Director, THyEL, Trongsa for kind Information
2. The Chief Forestry Officer, Divisional Forest Office, Bumthang for kind information
3. The Gu, Gewog Administration, Drakteng Gewog for kind information
4. The Chairperson, Eusa Barpo and Taktse Community Forest Management Group, Drakteng Gewog
5. The Beat Incharge, Beat Office, Drakteng Gewog for necessary follow up.
6. Office Copy

Trongsa Range Office: +975-03-521636/521415, Post Box: 574

CFO: +975-03-631182/631474 Fax: 631131

**Royalty Statement and Compensation on Damage caused to the Resources during Construction of 132 Kv DC
Transmission Line for 118 MW, Tangsibji Hydro Energy Limited (THyEL)**
Name of Community Forest : Eusa Barpo Community Forest
Gewog: Drakteng Gewog

1. Species: *Juglans regia*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	1' to 1'11"	9.9 cm - 14.9 cm	Special	0	60	0.00	Assumed 12' to 17'11"
		15 cm - 19.9 cm	Special	1	60	60.00	
2	2' to 2'11"	20 cm - 24.9 cm	Special	0	80	0.00	
		25 cm - 29.9 cm	Special	1	80	80.00	Assumed 18' and over
3	3' to 3'11"	30 cm - 34.9 cm	Special	0	320	0.00	
		35 cm - 39.9 cm	Special	2	320	640.00	
4	5' to 5'11"	50 cm - 54.9 cm	Special	0	1200	0.00	
		55 cm - 59.9 cm	Special	1	1200	1200.00	
		Total		5		1980.00	


2. Species: *Quercus griffithii*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	1' to 1'11"	10 cm - 14.9 cm	B	18	6	108.00	
		15 cm - 19.9 cm	B	175	6	1050.00	
2	2' to 2'11"	20 cm - 24.9 cm	B	0	6	0.00	
		25 cm - 29.9 cm	B	7	6	42.00	
3	3' to 3'11"	30 cm - 34.9 cm	B	15	140	2100.00	
		35 cm - 39.9 cm	B	9	140	1260.00	
4	4' to 4'11"	40 cm - 44.9 cm	B	11	240	2640.00	
		45 cm - 49.9 cm	B	6	240	1440.00	
5	5' to 5'11"	50 cm - 54.9 cm	B	7	480	3360.00	
		55 cm - 59.9 cm	B	4	480	1920.00	
6	6' to 6'11"	60 cm - 64.9 cm	B	1	680	680.00	
		65 cm - 69.9 cm	B	2	680	1360.00	
7	7' to 7'11"	70 cm - 74.9 cm	B	2	840	1680.00	
		75 cm - 79.9 cm	B	0	840	0.00	
8	8' to 8'11"	80 cm - 84.9 cm	B	1	1020	1020.00	
		85 cm - 89.9 cm	B	0	1020	0.00	
		Total		258		18660.00	

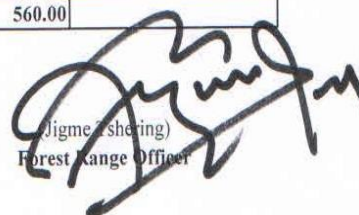
3. Species: *Symplocos spp*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	3' to 3'11"	30 cm - 34.9 cm	B	1	140.00	140.00	
		35 cm - 39.9 cm	B	3	140.00	420.00	
		Total		4		560.00	

Submitted by:


(Sonam Rinzin)
Forest Ranger - II

Verified By:


(Jigme Tshering)
Forest Range Officer

**Royalty Statement and Compensation on Damage caused to the Resources during Construction of 132 Kv DC
Transmission Line for 118 MW, Tangsibji Hydro Energy Limited (THyEL)**

Name of Community Forest : Eusa Barpo Community Forest

Gewog: Drakteng Gewog

4. Species: *Castanopsis sp (Sokeyshing)*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	2' to 2'11"	20 cm - 24.9 cm	B	0	6	0.00	
		25 cm - 29.9 cm	B	4	6	24.00	
2	3' to 3'11"	30 cm - 34.9 cm	B	2	140	280.00	
		35 cm - 39.9 cm	B	4	140	560.00	
3	4' to 4'11"	40 cm - 44.9 cm	B	4	240	960.00	
		45 cm - 49.9 cm	B	1	240	240.00	
4	5' to 5'11"	50 cm - 54.9 cm	B	2	480	960.00	
		55 cm - 59.9 cm	B	1	480	480.00	
5	7' to 7'11"	70 cm - 74.9 cm	B	1	840	840.00	
		75 cm - 79.9 cm	B	0	840	0.00	
		Total		19		4344.00	

5. Species: *Quercus semicarpifolia*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	1' to 1'11"	9.9 cm - 14.9 cm	B	0	6	0.00	
		15 cm - 19.9 cm	B	20	6	120.00	
2	2' to 2'11"	20 cm - 24.9 cm	B	0	6	0.00	
		25 cm - 29.9 cm	B	4	6	24.00	
3	3' to 3'11"	30 cm - 34.9 cm	B	5	140	700.00	
		35 cm - 39.9 cm	B	4	140	560.00	
4	4' to 4'11"	40 cm - 44.9 cm	B	4	240	960.00	
		45 cm - 49.9 cm	B	1	240	240.00	
5	5' to 5'11"	50 cm - 54.9 cm	B	2	480	960.00	
		55 cm - 59.9 cm	B	3	480	1440.00	
6	6' to 6'11"	60 cm - 64.9 cm	B	2	680	1360.00	
		65 cm - 69.9 cm	B	0	680	0.00	
7	7' to 7'11"	70 cm - 74.9 cm	B	1	840	840.00	
		75 cm - 79.9 cm	B	1	840	840.00	
		Total		47		8044.00	

Submitted by:

Verified By:


(Sonam Rinzin)
Forest Ranger - II


(Jigme Tshering)
Forest Range Officer

**Royalty Statement and Compensation on Damage caused to the Resources during Construction of 132 Kv DC
Transmission Line for 118 MW, Tangsibji Hydro Energy Limited (THyEL)**

Name of Community Forest : Eusa Barpo Community Forest

Gewog: Drakteng Gewog

6. Species: *Alnus nepalensis*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	1' to 1'11"	9.9 cm - 14.9 cm	B	0	6	0.00	
		15 cm - 19.9 cm	B	22	6	132.00	
2	3' to 3'11"	30 cm - 34.9 cm	B	0	140	0.00	
		35 cm - 39.9 cm	B	3	140	420.00	
3	7' to 7'11"	70 cm - 74.9 cm	B	1	840	840.00	
		75 cm - 79.9 cm	B	0	840	0.00	
		Total		26		1392.00	

7. Species: *Others Broad Leaved*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	2' to 2'11"	20 cm - 24.9 cm	B	0	6	0.00	
		25 cm - 29.9 cm	B	2	6	12.00	
2	3' to 3'11"	30 cm - 34.9 cm	B	4	140	560.00	
		35 cm - 39.9 cm	B	0	140	0.00	
3	4' to 4'11"	40 cm - 44.9 cm	B	4	240	960.00	
		45 cm - 49.9 cm	B	1	240	240.00	
4	5' to 5'11"	50 cm - 54.9 cm	B	1	480	480.00	
		55 cm - 59.9 cm	B	1	480	480.00	
5	7' to 7'11"	70 cm - 74.9 cm	B	0	840	0.00	
		75 cm - 79.9 cm	B	0	840	0.00	
		Total		13		2732.00	
		Grand Total		372		37712.00	

In Words: Thirty Seven Thousand Seven Hundred and Twelve Only

Submitted by:

Verified By:



(Sonam Rinzin)
Forest Ranger - II



(Jigme Tshering)
Forest Range Officer

**Royalty Statement and Compensation on Damage caused to the Resources during Construction of 132 Kv DC
Transmission Line for 118 MW, Tangsibji Hydro Energy Limited (THyEL)**

Name of Community Forest : Taktse Community Forest

Gewog: Drakteng Gewog

1. Species: *Carpinus vimenea*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	5' to 5'11"	50 cm - 54.9 cm	Special	1	1200	1200.00	
		55 cm - 59.9 cm	Special	1	1200	1200.00	
2	6' to 6'11"	60 cm - 64.9 cm	Special	2	1800	3600.00	
		65 cm - 69.9 cm	Special	0	1800	0.00	
3	8' to 9'11"	80 cm - 84.9 cm	Special	0	3400	0.00	
		85 cm - 89.9 cm	Special	1	3400	3400.00	
4	10' and over		Special	1	4000	4000.00	
		Total		6		13400.00	

2. Species: *Acer Sp*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	4' to 4'11"	40 cm - 44.9 cm	A	4	240	960.00	
		45 cm - 49.9 cm	A	0	240	0.00	
2	5' to 5'11"	50 cm - 54.9 cm	A	0	740	0.00	
		55 cm - 59.9 cm	A	1	740	740.00	
3	6' to 6'11"	60 cm - 64.9 cm	A	2	1100	2200.00	
		65 cm - 69.9 cm	A	0	1100	0.00	
4	7' to 7'11"	70 cm - 74.9 cm	A	4	1400	5600.00	
		75 cm - 79.9 cm	A	0	1400	0.00	
		Total		11		9500.00	

3. Species: *Quercus lanata*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	4' to 4'11"	40 cm - 44.9 cm	B	2	240	480.00	
2	8' to 8'11"	80 cm - 84.9 cm	B	1	1020	1020.00	
		85 cm - 89.9 cm	B	0	1020	0.00	
		Total		3		1500.00	

Submitted by:

Verified By:


(Sonam Rinzin)
Forest Ranger - II


(Jigme Tshering)
Forest Range Officer

**Royalty Statement and Compensation on Damage caused to the Resources during Construction of 132 Kv DC
Transmission Line for 118 MW, Tangsibji Hydro Energy Limited (THyEL)**

Name of Community Forest : Taktse Community Forest

Gewog: Drakteng Gewog

4. Species: *Cinnanomom sp*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	5' to 5'11"	50 cm - 54.9 cm	B	2	480	960.00	
		55 cm - 59.9 cm	B	0	480	0.00	
2	6' to 6'11"	60 cm - 64.9 cm	B	2	680	1360.00	
		65 cm - 69.9 cm	B	0	680	0.00	
3	7' to 7'11"	70 cm - 74.9 cm	B	1	840	840.00	
		75 cm - 79.9 cm	B	0	840	0.00	
4	8' to 8'11"	80 cm - 84.9 cm	B	1	1020	1020.00	
		85 cm - 89.9 cm	B	0	1020	0.00	
		Total		6		4180.00	

5. Species: *Persea Sp*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	5' to 5'11"	50 cm - 54.9 cm	B	2	480	960.00	
		55 cm - 59.9 cm	B	0	480	0.00	
2	6' to 6'11"	60 cm - 64.9 cm	B	6	680	4080.00	
		65 cm - 69.9 cm	B	0	680	0.00	
		Total		8		5040.00	

6. Species: *Castanopsis sp (Sokeyshing)*

Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	5' to 5'11"	50 cm - 54.9 cm	B	3	480	1440.00	
		55 cm - 59.9 cm	B	0	480	0.00	
2	7' to 7'11"	70 cm - 74.9 cm	B	2	840	1680.00	
		75 cm - 79.9 cm	B	0	840	0.00	
3	8' to 9'11"	80 cm - 84.9 cm	B	1	1020	1020.00	
		85 cm - 89.9 cm	B	3	1020	3060.00	
4	10' and over		B	1	1220	1220.00	
		Total		10		8420.00	

Submitted by:

Verified By:



(Sonam Rinzin)
Forest Ranger - II



(Jigme Tshering)
Forest Range Officer

**Royalty Statement and Compensation on Damage caused to the Resources during Construction of 132 Kv DC
Transmission Line for 118 MW, Tangsibji Hydro Energy Limited (THyEL)**

Name of Community Forest : Taktse Community Forest

Gewog: Drakteng Gewog

7. Species: *Daphniphyllum* sp

7. Species: <i>Daphniphyllum</i> sp							
Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	3' to 3'11"	30 cm - 34.9 cm	B	2	140.00	280.00	
		35 cm - 39.9 cm	B	0	140.00	0.00	
2	4' to 4'11"	40 cm - 44.9 cm	B	4	240.00	960.00	
		45 cm - 49.9 cm	B	0	240.00	0.00	
3	7' to 7'11"	70 cm - 74.9 cm	B	3	840.00	2520.00	
		75 cm - 79.9 cm	B	0	840.00	0.00	
4	8' to 9'11"	80 cm - 84.9 cm	B	1	1020.00	1020.00	
		85 cm - 89.9 cm	B	1	1020.00	1020.00	
		Total		11		5800.00	

8. Species: *Symplocos* sp

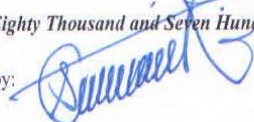
G. Species: <i>Symplocos</i> sp							
Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	3' to 3'11"	30 cm - 34.9 cm	B	5	140.00	700.00	
		35 cm - 39.9 cm	B	0	140.00	0.00	
2	4' to 4'11"	40 cm - 44.9 cm	B	5	240.00	1200.00	
		45 cm - 49.9 cm	B	0	240.00	0.00	
3	5' to 5'11"	50 cm - 54.9 cm	B	5	840.00	4200.00	
		55 cm - 59.9 cm	B	0	840.00	0.00	
4	8' to 9'11"	80 cm - 84.9 cm	B	2	1020.00	2040.00	
		85 cm - 89.9 cm	B	0	1020.00	0.00	
		Total		17		8140.00	

9. Species: *Other Broad Leaved* sp

9. Species: <i>Other Broad Leaved sp</i>							
Sl. No	Girth Class		Timber Class	No of Trees	Rate	Total Royalty (Amount)	Remarks
	Feet	DBH (cm)					
1	2' to 2"	Pole Size	B	120	6.00	720.00	Pole Size
2	3' to 3'11"	30 cm - 34.9 cm	B	87	140.00	12180.00	
		35 cm - 39.9 cm	B	0	140.00	0.00	
3	4' to 4'11"	40 cm - 44.9 cm	B	7	240.00	1680.00	
		45 cm - 49.9 cm	B	0	240.00	0.00	
4	5' to 5'11"	50 cm - 54.9 cm	B	6	840.00	5040.00	
		55 cm - 59.9 cm	B	0	840.00	0.00	
5	6' to 6'11"	60 cm - 64.9 cm	B	3	680.00	2040.00	
		65 cm - 69.9 cm	B	0	680.00	0.00	
6	8' to 9'11"	80 cm - 84.9 cm	B	3	1020.00	3060.00	
		85 cm - 89.9 cm	B	0	1020.00	0.00	
		Total		226		24720.00	
		Grand Total		298		80700.00	

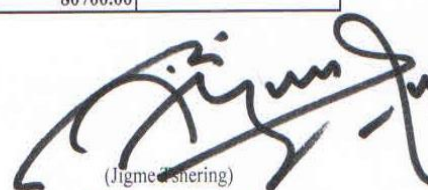
In words: Eighty Thousand and Seven Hundred Only

Submitted by:



(Sonam Rinzin)
Forest Ranger - II

Verified By:



(Jigme Chhoring)
Forest Range Officer

6.2 Disbursement of compensation made for clearing of vegetation in CF area

Money Receipt

July 13, 2020

Received with thanks Nu.37,712.00/- (*Ngultrum Thirty Seven Thousand Seven Hundred Twelve*) only vide Cheque No. 232630 from 132kV Nikachhu TPO, TCD, TS, BPC, Dangdung as payment for right of way (R.o.W) tree compensation for construction of towers and conductor stringing works due to construction of 132kV D/C Nikachhu transmission line via our community forest.

Yours sincerely,

Witness:

Mr. Karma,
Thrizin,
Eusa-Barpo, CF,
Drakteng, Trongsa.
Contact # 17906264



[Signature]

Thrizin,
Drakten Gewog,
Trongsa, Bhutan.

ཁྲུང་གཤམ་རྒྱུ་ཁྲུང་གཤམ་
ཁྲུང་གཤམ་རྒྱུ་ཁྲུང་གཤམ་

[Signature]

Kintu Zangmo,
Beat office,
Drakteng, Trongsa.

Money Receipt

July 13, 2020

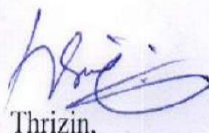
Received with thanks Nu.80,700.00/- (*Ngultrum Eighty Thousand Seven Hundred*) only vide Cheque No. 232629 from 132kV Nikachhu TPO, TCD, TS, BPC, Dangdung as payment for right of way (R.o.W) tree compensation for construction of towers and conductor stringing works due to construction of 132kV D/C Nikachhu transmission line via our community forest.

Yours sincerely,

Witness:



Mr. Chimi,
Thrizin,
Taksu CF,
Drakteng, Trongsa.
Contact # 77451520



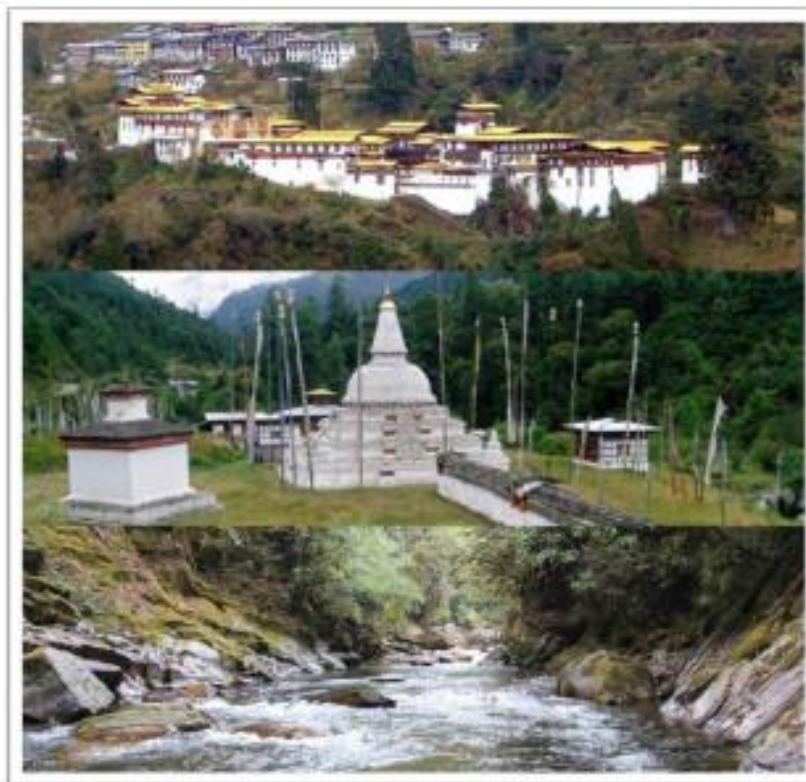
Thrizin,
Drakten Gewog,
Trongsa, Bhutan.



Kintu Zangmo,
Beat office,
Drakteng, Trongsa.

ཆོས་
འཕེལ་ཆེད་ཆོས་ཀྱི་སྐུ་མཁའ་མཆོད་པའི་མཆོད་པ་མཆོད་པའི་མཆོད་པ་

6.3 EIA for 132 kV transmission line of 118 MW NHPP



NIKACHHU HYDROPOWER PROJECT, BHUTAN (118 MW)

ENVIRONMENTAL IMPACT ASSESSMENT FOR 132 kV TRANSMISSION LINE FROM
NIKACHHU POTHEAD YARD TO MANGDECHHU POTHEAD YARD- 2014

Prepared for:
 Druk Green Power Corporation Limited and Tangsibji
 Hydro Energy Limited (THyE)
 Thori Lam, Thimphu
 Bhutan

Prepared by:
 Bhutan Consultants & Research (BHUCORE)
 Taba, Post Box: 955, Thimphu
 (revised by PWC Consultants)