

Environmental Monitoring Report

Semi-Annual Report
January-June 2014

INO: West Kalimantan Power Grid Strengthening Project

Prepared by the joint venture of Tractebel Engineering Ltd. and Power Grid International Limited (Thailand) with sub-consultancy from PT. Caturbina Guna Persada for PT(Persero) Perusahaan Listrik Negara and the Asian Development Bank.



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SEMI-ANNUAL REPORT **on** **ENVIRONMENTAL ISSUES**

of
Project Implementation Strengthening of West Kalimantan Power Grid



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Contract No. : 0107.PJ/041/DIR/2013
30th July, 2013

JOINT VENTURE OF TRACTEBEL ENGINEERING LTD AND
POWERGRIDINTERNATIONAL LIMITED (THAILAND)

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1. INTRODUCTION

In accordance with ADB's Project Administration Manual of July 2013 for the West Kalimantan Power Grid Strengthening Project, Article IX, B. Monitoring, item 86. Safeguards monitoring (Environment, (vi)) "reports on the implementation of the environmental mitigating measures and the environmental management and monitoring plans specified in the IEE and EMP are submitted to ADB on a semi-annual basis."

This report also corresponds with the IEE, Appendix F "Sample Mitigation Compliance Inspection Monitoring Form", and Appendix G "Sample Project Environmental Progress and Monitoring Report".

PT PLN (Persero) has assigned the Joint Venture of Tractebel Engineering Ltd. and Power Grid International Limited (Thailand), Contract No. 0107.PJ/041/DIR/2013 of 30th July, 2013, to carry out the monitoring of the project works.

The project comprises of design, supply, installation, testing, and commissioning of the works as the following:

- Package 1: 275 kV Transmission Line between Bengkayang substation and the border with Sarawak, East Malaysia (82 km).
- Package 2: 275/150 kV Substation at Bengkayang.
- Package 3: 150 kV Transmission Line from Bengkayang substation to the new Ngabang substation (92 km), and from there to the existing Tayan substation (53 km).
- Package 4: 150/20 kV Substation at Ngabang and Tayan Substation extension.

The Monitoring of the environmental works is carried out for all four packages of the works as mentioned above. The location of the project is presented on Map 1 and the West Kalimantan Power Grid Strengthening Project is presented on Map 2.

Comparing with the original schedule mentioned in IEE, there are some route changes due to the relocation of the planned sites for 275/150/20 kV Bengkayang substation and 150/20 kV Ngabang substation.

- According to the original plan of the 275 kV Bengkayang –Jagoibabang Transmission Line (Sarawak border) comprises of 199 towers (Tower No 1 in Bengkayang to Tower No 199 in Jagoibabang). Six towers from No.1 to 6 will be eliminated, in addition 4 towers will be erected. There are an additional of 4 intermediate/insertion towers. So in total, there will be 201 towers i.e. in total two additional towers on the 275 kV Bengkayang – Jagoibabang Transmission Line route.
- According to the original plan, 150 kV Bengkayang-Ngabang and 150 kV Tayan-Ngabang transmission line routes comprise of 260 towers and 133 Towers respectively. There are several modifications of the towers:
 - a) Due to 275/150 kV Bengkayang Substation shifted North-Eastern, there will be the elimination of 3 towers and addition of 7 new towers.
 - b) Due to site relocation of 150/20 kV Ngabang Substation to South of Ngabang and thus closer in Tayan direction, a number of towers will be relocated:
 - ✓ Bengkayang-Ngabang: 7 towers
 - ✓ Tayan-Ngabang: 4 towers (near former location of Ngabang substation) and 4 towers (near New Ngabang substation)
 - c) As New Ngabang substation is now closer to Tayan direction, there will be new arrangement of tower numbering. 17 towers originally of the Tayan-Ngabang section will be considered as Bengkayang–Ngabang route. Thereby the Bengkayang-Ngabang and Tayan-Ngabang transmission lines will comprise of 280 towers and 116 towers respectively.

Detailed information concerning environmental review on relocation of the substations and towers, is elaborated in detail in Appendix 6.

Map 1. Project location on the Map of Indonesia



Map 2 The map of West Kalimantan Power Grid Strengthening Project



The summary of project works implementation progress up to the end of June 2014 was as follows:

1.1. Summary of Construction Progress of Package 1: 275 kV Bengkayang–Jagoibabang Transmission Line.

There are 201 planned towers to be constructed for the 82 km transmission line. The following is the progress of the works up to end of June 2014.

No	Type of works	Progress of works
1	Tower foundations	
a	Soil works	111 locations of which 20 are not completed yet
b	Concrete works	96 locations of which 9 are not completed yet
2	Tower erection	63 towers have been erected
3	Stringing	<i>Not started yet, planned to commence in August 2014 for section tower 119 to 134</i>

1.2. Summary of Construction Progress of Package 2: 275/150/20 kV Bengkayang Substation

The area of 275/150/20 kV Bengkayang Substation is developed adjacent to another PLN project (150 kV substation of Bengkayang-Singkawang transmission line) which was started earlier and is more advanced in its progress of works. The progress of construction of the 275/150/20 kV Bengkayang Substation is as follows:

No	Type of works	Progress of works
1	Civil works	
a	Cut and fill	The land preparation for the 275/150/20 kV substation has been completed
b	Concrete works	The foundation works for main structure and retaining wall have been started for 150 kV area, but no activities for 275 kV area
2	Electro-Mechanical works	
a	Mechanical (Metal) works	<i>Not started yet</i>
b	Electrical works	<i>Not started yet</i>

1.3. Summary of Construction Progress of Package 3: 150 kV Bengkayang - Ngabang – Tayan Transmission Lines

Package 3 comprises of the two sections Bengkayang-Ngabang and Ngabang – Tayan transmission lines. There are 20 additional towers required for the Bengkayang- Ngabang transmission line, which consist of 16 due to the shifting of Ngabang substation to new location and four additional towers due to shifting of the Bengkayang substation to northern direction, so the tower numbers have been changed as follows:

- Original plan of Bengkayang-Ngabang transmission lines with 260 towers had to be increased to 280 towers
- Original plan of Ngabang-Tayan transmission lines with 133 towers was reduced to 116 towers.

No	Type of works	Progress of works
I Bengkayang – Ngabang Transmission Line route		
1	Tower foundations	
a	Soil works	6 locations have been excavated of which 1 is not completed yet.
b	Concrete works	6 locations have been constructed of which 1 is not completed yet
2	Tower erection	<i>Not started yet</i>
3	Stringing	<i>Not started yet</i>
II Ngabang – Tayan Transmission Line route		
1	Tower foundations	
a	Soil works	3 locations have been excavated of which 1 location is not completed yet
b	Main civil and infrastructure works	<i>Not started yet</i>
2	Tower erection	<i>Not started yet</i>
3	Stringing	<i>Not started yet</i>

1.4. Summary of Construction Progress of Package 4: 150/20 kV Ngabang Substation and Tayan Substation Extension

The construction progress of package 4 is as the following:

No	Type of works	Progress of works
I 150/20 kV Ngabang Substation		
1	Civil works	
a	Cut and fill	The land preparation for the substation area has been finished.
b	Main civil and infrastructure works	The temporary office and retaining wall near the road side area have been started.
2	Electro-Mechanical works	
a	Mechanical (Metal) works	<i>Not started yet</i>
b	Electrical works	<i>Not started yet</i>
II 150/20 kV Tayan Substation		
1	Civil works	
a	Cut and fill	The land preparation for the substation area has been finished.
b	Main civil and infrastructure works	Civil works for foundation of main structure has been finished.
2	Electro-Mechanical works	
a	Mechanical (Metal) works	<i>Not started yet</i>
b	Electrical works	<i>Not started yet</i>

2. SUMMARY OF ENVIRONMENTAL PROGRESS

The environmental works implementation progress at the end of June 2014 are as the following:

2.1. Summary Environmental Progress of Package 1: 275 kV Bengkayang – Jagoibabang Transmission Line

The environmental works implementation progress of Package 1 is as the following:

No	Environment Impact / Concern	Mitigation Implementation progress	Note
1	Land Compensation	End of June: 188 locations out of 201 planned locations	See social report for details.
2	Vegetation clearing	Good progress for tower locations but not yet started for the ROW.	For tower sites, vegetation clearing were being conducted prior to civil works being initiated.
3	Soil erosion	No need protection for flat area. There are 65 towers need to be protected (simple civil works and/or vegetation/ grass cover)	65 towers have been identified as located in the slope of more than 30 degrees
4	Drainage	No need special drainage	
5	Water quality	Simple measures.	Insignificant due to micro scale and scattered areas.
6	Air quality	Few machinery causing air pollution were used.	Insignificant due to micro scale and scattered areas
7	Construction waste	Cleaning out the remaining construction waste partly have been conducted	Plastic, hemp sack
8	Domestic waste	Removal of domestic waste remains to be done for most locations.	Mostly plastic of food wraps
9	Roads and infrastructure	No impact	
10	Occupational health and safety	Poor	
11	Community health and safety	Fair	
12	Employment opportunities	Fair to good	Local people were hired for transporting the material from roadside to towers locations.

2.2. Summary Environmental Progress of Package 2: 275/150/20 kV Bengkayang Substation

The environmental works implementation progress of Package 2 is as the following:

No	Environment Impact/ Concern	Mitigation Implementation progress	Note
1	Land Compensation	Completed	
2	Soil erosion	Construction of retaining wall in progress	
3	Drainage	Temporary drainage	
4	Water quality	Fair	
5	Air quality	Fair	Few machinery causing air pollution were used
6	Construction waste	Fair	
7	Domestic waste	Fair	
8	Roads and infrastructure	No impact up to now	
9	Occupational health and safety	Fair	
10	Community health and safety	Fair	
11	Employment	Poor	Few local people were hired

No	Environment Impact/ Concern	Mitigation Implementation progress	Note
	opportunities		

2.3. Summary Environmental Progress of Package 3: 150 kV Bengkayang - Ngabang – Tayan Transmission Lines

The environmental works implementation progress of Package 3 is as the following:

No	Environment Impact / Concern	Mitigation Implementation progress	Note
I Bengkayang – Ngabang Transmission Line route			
1	Land Compensation	End of June: 182 locations of 280 planned locations.	See social report for details.
2	Vegetation clearing	Good progress for tower location but not yet started for the ROW.	For tower sites, vegetation clearing were being conducted prior to civil works being initiated.
3	Soil erosion		Towers under construction are located in the relatively flat area, slope of more than 30 degrees have not been identified yet.
4	Drainage	No need for special drainage	
5	Water quality	Simple measures.	Insignificant due to micro scale and scattered areas.
6	Air quality	Few machinery causing air pollution were used.	Insignificant due to micro scale and scattered areas
7	Construction waste	Cleaning out the remaining construction waste partly has been conducted.	
8	Domestic waste	Removal of domestic waste remains to be done for most locations.	
9	Roads and infrastructure impact	No impact	
10	Occupational health and safety	Poor	
11	Community health and safety	Fair	
12	Employment opportunities	Fair	Local people were hired for transporting the material from roadside to towers locations
II Ngabang – Tayan Transmission Line route			
1	Land Compensation	End of June: 38 locations out of 116 planned locations.	See social report for details.
2	Vegetation clearing	Good progress for tower locations but not yet started for the ROW.	For tower sites, vegetation clearing were being conducted prior to civil works being initiated.
3	Soil erosion		Towers under construction are located in the relatively flat area, slope of more than 30 degrees have not been identified yet.
4	Drainage	No need for special drainage	
5	Water quality	Simple measures.	Insignificant due to micro scale and scattered areas.
6	Air quality	Few machinery causing air pollution were used.	Insignificant due to micro scale and scattered areas
7	Construction waste	<i>Not started yet</i>	

No	Environment Impact / Concern	Mitigation Implementation progress	Note
8	Domestic waste	Removal of domestic waste remains to be done for most locations.	
9	Roads and infrastructure impact	No impact	
10	Occupational health and safety	Poor	
11	Community health and safety	Fair	
12	Employment opportunities	Fair	

2.4. Summary Environmental Progress of Package 4: 150/20 kV Ngabangand Tayan substations

The environmental works implementation progress of Package 4 is as the following:

No	Environment Impact / Concern	Mitigation Implementation progress	Note
I Ngabang Substation			
1	Land Compensation	Completed	
2	Soil erosion	Not implemented yet	
3	Drainage	No drainage	The run-off water with eroded soil sediment flows over the main road.
4	Water quality	Fair	
5	Air quality	Fair	Few machinery causing air pollution were used
6	Construction waste	Fair	
7	Domestic waste	Fair	
8	Roads and infrastructure impact	Not implemented yet	The run-off water with eroded soil sediment flows over the main road.
9	Occupational health and safety	Poor	
10	Community health and safety	Poor	
11	Employment opportunities	Fair	
II Tayan Substation			
1	Land Compensation	Completed	
2	Soil erosion	Not implemented yet	
3	Drainage	Part of drainage system will share with the existing one (finished).	
4	Water quality	Fair	
5	Air quality	Fair	Few machinery causing air pollution were used
6	Construction waste	Fair	
7	Domestic waste	Fair	
8	Roads and infrastructure impact	No impact up to now	
9	Occupational health and safety	Poor	
10	Community health and safety	Fair	
11	Employment	Fair	

No	Environment Impact / Concern	Mitigation Implementation progress	Note
	opportunities		

3. ENVIRONMENTAL MITIGATIONS AND LAND ACQUISITION IMPLEMENTED

3.1. Environmental Mitigations

a) Air Quality:

Air quality deterioration could be caused by exhaust gas of construction vehicles (truck, car, motor cycle), operation of concrete mixer drilling/piling machineries and heavy vehicles for land preparation (mostly utilized for substation areas; for tower sites it is very rare).

- *Concrete mixer:* For concrete pouring of each tower pad, contractor applied small unit of concrete mixer for intermittent use for about 2-3 hours a day (in average 8 machine-days) to complete concrete pouring for the foundations of each tower. Mostly, it generated insignificant impact on air quality due to short duration and most towers are located away from dwelling areas.
- *Drilling and excavation:* Contractor applied high intensive manual labor for excavation of tower pads so no air pollution for this activity. Drilling holes for concrete piles was conducted for the tower site with low bearing capacity of soil. In wet soil drilling machine was used, while in the dry soil it used manual drilling. In the tower side with good condition of soil no drilling to be conducted. The air pollution impact due to drilling was considered moderate.
- *Erection of towers:* Contractor applied manual winch/pulley for elevating the assembled steel member of tower erection development. No machinery used, so there is no air pollution.
- *Transportation of material.* From warehouse to roadside near the sites, contractor applied trucks in good condition. Air quality deterioration caused by the fugitive dust can be neglected because there were no insignificant fugitive dust. From roadside to tower sites, contractor mostly used labour and motor cycles or used small trucks wherever possible. Air pollution was very small and dispersed.
- *Land preparation of the substations.* The land preparation conducted at Bengkayang and Ngabang but not for Tayan substations (the site has been ready). The original area is undulating land, so it needed soil works to level the site. The higher soil level was excavated to fill the lower level using bulldozer and backhoe. No quarry from outside was needed for the embankment, all soil for embankment comes from the same area, in consequence no truck was going in and out to public road or other places concerning this activity, so there was no fugitive dust in the surrounding area during the land preparation.

b) Water Quality

Water quality deterioration could be caused by soil works, concrete works, oil spill (oily water). Soil works may generate sedimentation and turbid water in water body. In tower pad area, where the excavation encountered the soil acid in nature, it also may produce acid sulphate soil. Concrete works usually produce alkaline water and turbid water due to the cement deposit. Oil spill could happen due to negligence, misconduct and accident, further it may cause oil pollution on soil and later oily water in water body.

- *Drillings and excavations.* In area of tower pad where the soil is classified as "soft soil" it shall be drilled to develop holes for concrete piles. Where the soil was considered good enough, no drilling was to be applied. Excavation was to be conducted in all tower pads with varied dimension, depending on topography and

type of tower. The drillings and excavations generated muddy soil and brown water with high soil sediment.

When it rains, and no barrier exists, the bare soil and soil sediment may wash away. In general, the contractor did not apply the protection measures to trap the sedimentation. Fortunately, most towers are located in areas where natural sediment screening is provided by grass, bushes and litter of foliage. In general this activity generated insignificant soil erosion. At the time being, there was no suspected acid sulphate soil, so no acidity soil and water pollution happened.

- *Land preparation.* The land preparation of Bengkayang, Ngabang and Tayan substations cover an area of about 4 hectare (ha), 1 ha and 1 ha respectively. The area are undulating and needed soil works to level the sites. The higher soil level was excavated to fill the lower level using bulldozer. Bare land may cause soil erosion and sedimentation, but fortunately there is no creek nor river in the adjacent area so sediment settled in the substation areas. Such concern was observed at Ngabang substation. During the rainy days, due to lack of drainage system along the road side at Ngabang substation the run-off water from the substation with the sediment eroded from the site flows over the main road causing muddy road.
- *Concrete works.* Most impact of concrete works usually happen during the cleaning/washing of the concrete mixer machine and other apparatus. It produces alkaline water and turbid water due to the cement deposit. In many instances, contractor dumped the waste water on ground within tower area. Due to small volume of each event, the waste water could be easily absorbed by the soil in the tower's area. There was insignificant impact caused by this activity.
- *Oil uses.* Other than transportation of material for the construction works of each tower, the contractor used diesel oil for powering the concrete mixer only. It is contained in tight jerrycans, and no oil spill was observed during the works.

c) Noise Quality

The noisiest equipment used was concrete mixer. Contractor applied concrete mixer for intermittent use and only for 2-3 hours a day (in average 8 machine-days) to complete concrete pouring for the foundations of each tower. There are ten towers of in the 275 kV Bengkayang transmission line with foundations applying Steel Mortar Composite Foundation (SMCF) system (approx. 4 to 6 days for each tower foundation) by use of a pile machine with rather loud noise. The tower sites were mostly located away from the inhabitant area and the works were conducted during daytime so the noise impact was insignificant.

d) Pollution Prevention

- Air Pollution
See the review of item a)
- Water Pollution and Soil Pollution
See the review of item b)
- Land Pollution.

In most cases, the contractor neglected to protect the land pollution caused by the construction and domestic waste.

The construction waste of paper cement containers, broken hemp sacks, plastic wraps and chunks of wood is found in development areas of most towers. As

the majority of towers are inaccessible by car, most material is transported by motorcycle or human. Sand and gravel were contained in hemp sacks and transported either by motorcycle or by human from roadside to tower sites. Cement of 50 kg each, was transported in fabricated paper container.

The domestic waste associated with the construction works was also encountered in most tower construction locations and its adjacent areas. Those wastes were produced by the construction workers who throw the garbage (plastic bottles, plastic wrap) carelessly to the surrounding environment.

The form work for casting concrete is made of wood, and is repeatedly used for concrete works at other tower locations.

e) Biodiversity and Natural Resources

The awareness of contractor/subcontractor/workers not to disturb the surrounding forest trees, was low during construction of foundations and towers of transmission lines. Subcontractor/workers frequently cut the small to medium trees in surrounding forest for fixing the form work for concrete works and other uses.

f) Health and Safety

The awareness of contractor/subcontractor/workers in Occupational Health and Safety (OHS) is low. The main contractor failed to demonstrate the most basic requirement of OHS, such as: Personnel in charge of OHS, OHS plan, conducting safety induction, requirement of wearing Personnel Protection Equipment (PPE) to all workers and guests, safety sign on workplace and reporting. Requirement of wearing PPE was partly applied, but must be improved.

g) Physical Cultural Resources

Until recently, the finding of physical cultural resources was not reported or observed during surveillance monitoring.

h) Employment opportunities

The construction of foundations and erection of towers need labours for carrying materials from roadside to tower site. The contractor recruited local people to conduct the job. It provided mutual benefit for the local people and the contractors. Especially in Seluas and Jagoibabang area the contractor for the 275 kV Bengkayang-Jagoibabang transmission line assigned local people as subcontractors for constructing the tower foundations.

i) Capacity Building

Contractor of package 2 at several time has conducted tool box meeting as capacity building for their worker, but no capacity building on Environment Management Plan, Implementation of Health & Safety, and Management of Social aspect was carried out by the contractor and subcontractors of other packages.

3.2. Land Acquisition

a) **275 kV Bengkayang–Jagoibabang Transmission Line**

Out of 201 tower sites there are 188 tower sites along the 275 kV Bengkayang-Jagoibabang transmission line which have been compensated, including 4 locations as re-route towers and 4 locations as insert towers. The 13 tower sites which have not

been compensated consist of twelve locations on forestry land and one location on private land.

Table 1. Summary of land acquisition/compensation status of 275 kV Bengkayang – Jagoibabang Transmission Line

NO	ROUTES AND LOCATION	TOTAL	COMPENSATION STATUS
1	Bengkayang Substation (275 kV and 150 kV)	1	Compensated
2	Towers on private land: A, B, C, D	4	Compensated
3	Towers on private land: 07 – 10	4	Compensated
4	Towers on Forestry land: 11 - 22	12	Not yet compensated
	Towers on Forestry land: 23 - 50	27	Compensated
5	Towers on private land: 51 – 78; and 80 - 193	143	Compensated
6	Towers on private land: 79	1	Not yet compensated. Owner demands high price for trees.
7	Tower 194 - 199 (Forestry land)	6	Compensated
8	Inserted towers 76A, 99A, 110A, 158A	4	Compensated
Total of Forestry land		45	
Total of Private land		156	
Total number of Towers		201	
Total of Compensated Tower's Land		188	
Total of not yet compensated land		13	

b) 150 kV Bengkayang– Ngabang-Tayan Transmission Line

There are 396 tower sites along the 150 kV Bengkayang – Ngabang-Tayan Transmission Line which comprises of 280 tower sites along Bengkayang-Ngabang alignment and 116 tower sites along Ngabang-Tayan alignment. There are 88 towers which will traverse the forestry land, out of them 65 towers of Bengkayang-Ngabang alignment (Towers 1A to 7A, 4 to 32; 82 to 103; and 144 to 151) and 23 towers of Tayan-Ngabang alignment (Towers 35 to 43; 53 to 54 and 57 to 68).

In total 220 tower locations have been compensated, they comprise of 182 tower sites located along the Bengkayang-Ngabang route and 38 tower sites located along Ngabang-Tayan alignment.

Both the new Ngabang and Tayan substation sites have been compensated.

Table 2 Summary of land acquisition/compensation status of 150 kV Bengkayang– Ngabang–Tayan Transmission Line and Substations

NO	ROUTES AND LOCATION	TOTAL	COMPENSATION STATUS
I	150 KV BENGKAYANG – NGABANG TRANSMISSION LINE AND NGABANG SUBSTATION		
1	New Ngabang Substation	1	Compensated
2	Towers on private land: 35 to 38, 40 to 42, 44, 45, 47 to 81, 91, 104 to 113, 115 TO 126; 128 to 143; 152 to 167, 170, 172 to 212, 220, 221, 225 to 229, 231 to 235 and 269-270 (ex Ngabang-Tayan T126-T127)	155	Compensated
3	Other towers on private land	60	Not yet compensated

NO	ROUTES AND LOCATION	TOTAL	COMPENSATION STATUS
4	Towers on Forestry land: 82 to 87; 89 to 90, 93 to 103 and 144 to 151	27	Compensated
5	Towers on Forestry land: 1A to 7A; 4 to 32	38	Not yet compensated
	Total number of towers for 150 kV Bengkayang – Ngabang Transmission Line	280	
II 150 KV TAYAN – NGABANG TRANSMISSION LINE AND TAYAN SUBSTATION			
1	Tayan substation extension	1	Compensated
2	Towers on private land: 69 to 87 and 100 to 110	30	Compensated
3	Other towers on private land	63	Not yet compensated
4	Towers on Forestry land: 61 to 68	8	Compensated
5	Towers on Forestry land: 35 to 43; 53 to 54 and 57 to 60	15	Not yet compensated
	Total number of towers for 150 kV Tayan – Ngabang Transmission Line	116	
150 kV BENGKAYANG-NGABANG-TAYAN			
	Total of Forestry land	88	
	Total of Private land	308	
	Total of Tower	396	
	Total of Compensated Tower's Land	220	
	Total of not yet compensated land	176	

Note: Due to new Ngabang substation located closer to Tayan direction, Tower # 117 up to #133 of Tayan-Ngabang T/L has been numbered as continuation of Bengkayang-Ngabang T/L

4. SUMMARY OF ENVIRONMENTAL COMPLIANCE MONITORING

4.1. Summary of Inspection Activities

- Vegetation clearing.* At many tower site locations the contractor conducted vegetation clearing confined to the tower and substationsites, except for the locations where there was no pathway, it has been practiced to clear the vegetation for access.
- Soil erosion.* In tower sites located in steep slope with high potential for erosion, the contractor shall provide soil erosion protection. The contractor may propose additional cost for this matter as stated in the contract document⁽¹⁾. Soil erosion protection can be tolerated not to be applied in non-critical sites such as a flat area or the site and its surrounding could naturally absorb the sedimentation. At Bengkayang and Ngabang substations construction of retaining wall commenced to reduce soil sliding and soil erosion.
- Drainage.* During the tower construction works, the construction of drainage was not practised in most tower sites, except in certain area where it is considered required e.g. very steep slope, near the flowing water area, etc. The drainage at Ngabang substation is required to be constructed soon, because during rain the run-off water

¹ Contract document Volume 1, Section 6: Employeey's Requirements, Sub Section 6.2.3: Technical Specification item 3.12 Payments for Towers and Foundations. *In this contract is stated that "Additional work which may be required to secure foundations against the effects of soil erosion will be paid for at the rates to be agreed"*

from the substation with the sediment eroded from the site and flowed over the main road causing a muddy road.

- d) *Acid sulphate soils.* No such soil was observed. No action required to be done.
- e) *Water quality impacts.* Fortower foundation works, the use of water was for drilling and concrete works, and these activities generated waste water. Most of the waste water from such activities is relatively small, and although it is directly dumped to the soil it usually could be absorbed by the soil at the tower sites. The Contractor did not provide asuitable barrier to prevent such waste water to escape from the tower site. Although it rarely happened, it could be observed that such water of drilling works spilled out to surrounding tower area, but only few meters from the tower site and the volume was small and it could be absorbed by the surrounding soil and create insignificant impact caused by this high soil sediment waste water.
- f) *Air quality impacts.* Contractor applied high intensive labor to conduct various works, i.e. transportation, drilling, elevating steel parts that in nature will not causeair quality impacts.
- g) *Construction waste management.* Contractor cleaned most of the construction waste, although some remaining chunk of woods, broken hemp sacks and cement paper containers remain to be removed.
- h) *Domestic waste management.* The waste originated mainly from the construction workers and other wasteoriginated from local people who were hired to transport the materials from roadsides to the tower sites. In most places the domestic waste was scattered within the tower sites, temporary shelter areas and along the temporary access pathway.
- i) *Roads and infrastructure impacts.* No impact was observed in such facilities.
- j) *Encroachment into protected forests, hunting, wood collection.* No encroachment was observed. The works have not yet initiated in the state forest land. At tower 150 of the 275 kV Bengkayang – Jagoibabang transmission line it was observed that the contractor had cut small trees of a community forest for developing the pathway of about 100 m to go to the tower site. Such pathway was required to be developed since the tower is located in swampy/muddyareas. The local population complained with the contractor, and during negotiations the contractor agreed to the request of the community to conduct a ceremony for the settlement of the incident at a cost of about 3 million rupiahs.

No firewood collection was observed, since the worker cooked their meal with the gas stove. No hunting activity by the workers was observed.

- k) *Occupational health and safety*
 - i. *The mobilization of materials.* In these works, the mobilization of metal parts for the towers is one concern from the OHS point of view. Loading and unloading works in the warehouse and at the roadside conducted by the front loader machine is considered not safe enough for conducting this kind of works.
 - ii. *Personal protection equipment.* For working during the tower foundation works, the PPE provided by the contractor for the workers is helmet and some with rubber shoes. Not all workers wore the helmet and rubber shoes. During the tower erection, the type of PPE is supposed to comprise at least of body harness, helmet and gloves. Contractor provided the helmet, and safety waist belt rather than body harness.
 - iii. *Safety line and notice.* The contractor generally did not provide this kind of OHS requirement.
 - iv. *Safety briefing.* The contractor generally did not provide this kind of instruction

prior to conducting the works.

l) Community health and safety

- i. *Prevention of HIV/AIDS.* The contractor did not provide the awareness or providing the measures in preventing the community and their workers safety concerning the sexually transmitted diseases.
- ii. *Safety line and notice.* The contractor generally did not provide this kind of OHS requirement in the unloading zone of materials at road sites and working areas for preventing the community entering the non-safety zone.
- iii. *The mobilization of materials.* The transport of metal parts for the towers is of concern from the OHS point of view. Loading and unloading works in the warehouse and at the roadside carried out with the front loader machine is considered not safe enough for conducting this kind of works and may endanger the community passing by.
- m) *Employment opportunities.* Contractor in most tower sites employed local people for transporting the construction materials from roadside to the tower site. Local people also enjoy indirect employment benefit from providing services such as lodging, meals, etc. for the construction employees and workers.
- n) *Physical cultural resources.* Until now no physical cultural resources were found and observed.

4.2. Mitigation Compliance

- a) *Vegetation clearing.* In most locations, the contractor complied with the mitigation requirement.
- b) *Soil erosion.* Contractor has not fully complied with the requirement. Contractor is supposed to apply soil erosion protection at the tower site which has high erosion rate such as steep slope location.
- c) *Drainage.* Most tower sites do not need the construction of a drainage system. Drainage system is needed in certain areas e.g. very steep slope, near the flowing water area. The compliance observation could not be reported at the time being. Such tower sites shall be agreed with between the parties involved (Contractor and PLN supported by the Consultant).
- d) *Acid sulphate soils.* Up to now, this type of soil was not found.
- e) *Water quality impacts.* Most towers surrounded by the landscape (grasses, and falling foliage) which screen the suspended solid contained in waste water generated from drilling and concrete works in the towers construction area. Although the contractor did not provide special treatment, according to observation the water quality impact seemed to comply with the requirement.
- f) *Air quality impacts.* Contractor complied with the requirement.
- g) *Construction waste management.* Contractor partly complied with the requirement, but in many cases it must be improved, since the construction waste still could be found at many tower locations.
- h) *Domestic waste management.* Contractor did not fully comply with the requirement.

Garbage originated from construction workers scattered in several tower locations. Almost all of the subcontractor's workers ignored this requirement

- i) *Roads and infrastructure impacts.* Contractor complied with the requirements.
- j) *Encroachment into protected forests, hunting, wood collection.* Contractor complied with the requirements.
- k) *Occupational health and safety.* Contractor partly complied with a few requirements, but most were ignored.
- l) *Community health and safety.* Contractor did not comply with the requirements.
- m) *Employment opportunities.* Contractor complied with the requirement. The local people were hired to transport the materials from roadside to the tower locations.
- n) *Physical cultural resources.* Until recently, no physical cultural resources were found or observed.

4.3. Mitigation Effectiveness

The mitigation effectiveness is very low due to lack of understanding and lack of awareness of environmental mitigation that is required to be accomplished by the contractors and its subcontractors. The environmental and OHS personnel who supposed to enforce the environmental requirement came from the contractor's head office who only appointed for the short duration in the site, and no fulltime officers appointed in the site office to implement the Environmental Management Plan (EMP). The EMP is mentioned in IEE (Initial Environment Examination) of 275 kV Regional Interconnection Transmission Line Mambong (Sarawak) to Bengkayang and 150 kV Transmission Lines Bengkayang to Tayan (West Kalimantan) published in 2011, in *RKL (Rencana Pengelolaan Lingkungan)* or Environmental Management Plan, *Kegiatan Pembangunan SUTET 275 kV GI Bengkayang – Perbatasan Sarawak* published in 2010 and in UKL-UPL (Upaya Pengelolaan dan Pemantauan Lingkungan) of 150 kV Bengkayang-Ngabang-Tayan transmission lines.

5. KEY ENVIRONMENTAL ISSUES

5.1. Environmental key Issues Identified

- a. The compliance of the EMP requirement is very low due to lack of awareness of environmental management among the contractors, subcontractors and their workers. The root cause is that there is no personnel in charge in the contractor's site office to enforce the EMP requirement.
- b. Awareness of Occupational Health and Safety management among the contractor, subcontractors and their workers are very low. The root cause is similar as above, that there is no personnel in charge in the contractor's site office to enforce the OHS requirement.

5.2. Action to be taken

- a. Insist of the four main contractorsto immediately deploy fulltime Environmental and OHS officers to enforce the EMP and OHS requirement: (i) PT Bukaka Teknik

Utama of Package 1: 275 kV Bengkayang-Jagoibabang Transmission Lines (ii) CG Consortium for Package 2: 275/150 kV Bengkayang substation.(iii) Consortium of KEC International Limited and Mitsubishi Corporation of Package 3: 150 kV Bengkayang– Ngabang-Tayan Transmission Lines, and (iv) Siemens for Package 4: 150/20 kV Ngabang and Tayan substation.

- Among main contractors' personnel
 - Among subcontractors and labors
 - Provide instruction for the labors to apply proper procedure concerning Environmental Management Plan
- b. Insist the personnel in charge of the four main contractors as above to conduct awareness of OHS within their own site organisation and theirs subcontractors.
- Among main contractors' personnel
 - Among subcontractors and labors
 - Provide instruction for the labors to apply proper procedure concerning Occupational Health and Safety.

6. CONCLUSION

6.1. Overall Progress of Implementation of Environmental Management Measures

The contractors' implementation of environmental management measures varied between good and poor as follows:

- In general the impact mitigation is good and fair for the following issues: air quality impact, employment opportunities, and roads and infrastructure impacts.
- The issues of cleaning the construction waste is considered fair, the contractor has removed almost all of the construction waste but some waste remained to be removed from the sites.
- The implementation of environmental management measures of the following issues are considered poor:
 - Soil erosion
 - Drainage
 - Domestic waste management
 - Occupational health and safety
- There are two issues which were not yet implemented, so no evaluation was conducted. These issues are in conditional matters, for which the environmental management measures shall be implemented when they are encountered during implementation:
 - Acid sulphate soils
 - Physical cultural resources

6.2. Problems Identified and Actions Recommended

- a. Insisting the four main contractors to deploy their Environmental and OHS personnel to be in charge of daily works.

- b. Insist of the four main contractorsto immediately assign the fulltime Environmental and OHS officers to enforce the EMP and OHS requirement in providing the awareness on EMP and OHS requirement to labors and providing instruction for the subcontractors and their labors to apply proper procedures.

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 - a) Maps of re-routes tower of 150 kV Bengkayang – Ngabang – Tayan Transmission lines and Ngabang substations.
 - b) Maps of re-routes tower of 275 kV Bengkayang – Jagoibabang Transmission line (Sarawak Border)
 - c) Land Compensation which has been conducted for Bengkayang – Jagoibabang Transmission lines and Bengkayang –Ngabang - Tayan transmission lines.

APPENDICES

APPENDIX

1. SITE INSPECTION / MONITORING REPORTS

1.1 Summary of Environmental and Health & Safety Performance.

- Appendix 1.1.1. Summary of Environmental and Health & Safety Performance of 275 kV Bengkayang-Jagoibabang transmission line.
- Appendix 1.1.2. Summary of Environmental and Health & Safety Performance of 275/150 kV Bengkayang substation.
- Appendix 1.1.3. Summary of Environmental and Health & Safety Performance of 150 kV Bengkayang–Ngabang-Tayan transmission lines.
- Appendix 1.1.4. Summary of Environmental and Health & Safety Performance of 150 kV Ngabang and Tayan Substations.

1.2 Mitigation Compliance Inspection Monitoring

- Appendix 1.2.1. Site Environmental Compliance Inspection and Monitoring of Package 1
- Appendix 1.2.2. Site Environmental Compliance Inspection and Monitoring of Package 2
- Appendix 1.2.3. Site Environmental Compliance Inspection and Monitoring of Package 3
- Appendix 1.2.4. Site Environmental Compliance Inspection and Monitoring of Package 4

Appendix:**1.1. Summary of Construction Progress, Environmental and Health & Safety performance****1.1.1. Summary of Construction Progress, Environmental and Health & Safety performance of 275 kV Bengkayang–Jagoibabang Transmission Line**

No (Sequential)	No. Tower	Compens Payment		Construction					Environmental Mitigation						Worker OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
1	A	1																		
2	B	1		1	1				4	4	3	2	3	3	2			3		
3	C	1		1	1				4	4	3	2	3	3	2			3		
4	D	1		1	1				4	4	3	2	3	3	2			3		
5	7	1		1					4	4	3	2	3	3	2			3		
6	8	1		1	1				4	4	3	2	3	3	2			3		
7	9	1		1					4	4	3	2	3	3	2			3		
8	10	1		1	1				4	4	3	2	3	3	2			3		
9	11																			
10	12																			
11	13																			
12	14																			
13	15																			
14	16																			
15	17																			
16	18																			
17	19																			
18	20																			
19	21																			
20	22																			
21	23	1																		
22	24	1																		
23	25	1																		
24	26	1																		
25	27	1																		
26	28	1																		
27	29	1																		
28	30	1																		
29	31	1																		
30	32	1																		
31	33	1																		
32	34	1																		
33	35	1																		
34	36	1																		
35	37	1																		
36	38	1																		
37	39	1																		
38	40	1																		
39	41	1																		
40	42	1																		
41	43	1																		
42	44	1																		
43	45	1																		
44	46	1																		
45	47	1																		
46	48	1																		
47	49	1																		

No (Sequential)	No. Tower	Compens Payment		Construction					Environmental Mitigation						Worker OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
48	50	1																		
49	51	1																		
50	52	1																		
51	53	1																		
52	54	1							3	3	2	2	3	3	2			3		
53	55	1							3	3	3	2	3	3	2			3		
54	56	1																		
55	57	1																		
56	58	1																		
57	59	1																		
58	60	1							4	4	2	2	3	3	2			3		
59	61	1		1	1				4	4	2	2	3	3	2			3		
60	62	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
61	63	1																		
62	64	1		1	1	1			3	3	2	3	3	3	2	2		3	3	
63	65	1		1	1	1			3	3	2	3	3	3	2	2		3	3	
64	66	1		1	1	1			3	3	2	3	3	3	2	2		3	3	
65	67	1							4	4	2	2	3	3	2	2		3	3	
66	68	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
67	69	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
68	70	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
69	71	1		1	1	1			4	4	3	3	3	3	2	2		3	3	
70	72	1							4	4		2	3	3	2			3		
71	73	1		1	1				4	4	2	2	3	3	2			3		
72	74	1		1	1	1			4	4	3	2	3	3	2	2		3	3	
73	75	1							4	4		2	3	3	2			3		
74	76	1		1	1	1			4	4	3	3	3	3	2	2		3	3	
75	76A	1							3	3	2	2	3	3	2			3		
76	77	1							3	3	2	2	3	3	2			3		
77	78	1																		
78	79																			
79	80	1																		
80	81	1		1	1	1			4	4	3	3	3	3	2	2		3	3	
81	82	1		1		1			4	4	3	3	3	3	2	2		3	3	
82	83	1		1	1	1			4	4	3	3	3	3	2	2		3	3	
83	84	1		1		1			4	4	3	3	3	3	2	2		3	3	
84	85	1							3	3	2	2	3	3	2			3		
85	86	1							4	4	2	2	3	3	2			3		
86	87	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
87	88	1		1	1				3	3	2	2	3	3	2			3		
88	89	1							3	3	2	2	3	3	2			3		
89	90	1		1	1				3	3	2	2	3	3	2			3		
90	91	1							3	3	2	2	3	3	2			3		
91	92	1							3	3	2	2	3	3	2			3		
92	93	1							3	3	2	2	3	3	2			3		
93	94	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
94	95	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
95	96	1		1	1	1			3	3	2	3	3	3	2	2		3	3	
96	97	1		1	1	1	1		4	4	3	3	3	3	2	2		3	3	
97	98	1		1	1				4	4	2	2	3	3	2			3		
98	99	1		1	1				4	4	2	2	3	3	2			3		
99	99A	1																		
100	100	1																		
101	101	1																		

No (Sequential)	No. Tower	Compens Payment		Construction					Environmental Mitigation						Worker OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
102	102	1																		
103	103	1																		
104	104	1																		
105	105	1		1	1				4	4	2	2	3	3	2			3		
106	106	1		1	1				4	4	3	2	3	3	2			3		
107	107	1		1	1				4	4	2	2	3	3	2			3		
108	108	1		1	1	1			3	3	2	3	3	3	2	2		3	3	
109	109	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
110	110	1		1	1	1			3	3	2	3	3	3	2	2		3	3	
111	110A	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
112	111	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
113	112	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
114	113	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
115	114	1		1	1				3	3	2	2	3	3	2			3		
116	115	1		1	1				3	3	2	2	3	3	2			3		
117	116	1	1	1	1	1			3	3	2	3	3	3	2	2		3	3	
118	117	1	1																	
119	118	1	1	1	1	1			4	4	2	3	3	3	2	2		3	3	
120	119	1	1	1	1	1	1		3	3	2	2	3	3	2			3		
121	120	1	1	1	1	1	1		3	3	3	3	3	3	2	2		3	3	
122	121	1	1	1	1	1	1		3	3	3	3	3	3	2	2		3	3	
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125	124	1	1	1	1	1	1		4	4	2	3	3	3	2	2		3	3	
126	125	1	1	1	1	1	1		3	3	3	3	3	3	2	2		3	3	
127	126	1	1	1	1	1	1		3	3	3	3	3	3	2	2		3	3	
128	127	1		1	1	1	1		3	3	3	3	3	3	2	2		3	3	
129	128	1		1	1	1	1		4	4	2	3	3	3	2	2		3	3	
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131	130	1		1	1	1	1		3	3	3	3	3	3	2	2		3	3	
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135	134	1		1	1	1	1		3	3	3	3	3	3	2	2		3	3	
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137	136	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
138	137	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
139	138	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
140	139	1							3	3	2	2	3	3	2			3		
141	140	1																		
142	141	1																		
143	142	1																		
144	143	1																		
145	144	1		1	1				3	3	3	2	3	3	2			3		
146	145	1							3	3	2	2	3	3	2			3		
147	146	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
148	147	1																		
149	148	1		1	1	1			4	4	2	3	3	3	2	2		3	3	
150	149	1																		
151	150	1		1	1	1			3	3	3	3	2	3	2	2		3	3	
152	151	1																		
153	152	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
154	153	1																		
155	154	1		1	1				3	3	3	2	3	3	2			3		

No (Sequential)	No. Tower	Compens Payment		Construction					Environmental Mitigation						Worker OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
156	155	1							4	4	3	2	3	3	2			3		
157	156	1																		
158	157	1																		
159	158	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
160	158A	1		1	1	1			4	4	3	3	3	3	2	2		3	3	
161	159	1							3	3	3	2	3	3	2			3		
162	160	1							3	3	2	2	3	3	2			3		
163	161	1																		
164	162	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
165	163	1		1	1	1			3	3	3	3	3	3	2	2		3	3	
166	164	1							3	3	2	2	3	3	2			3		
167	165	1		1	1				4	4	2	2	3	3	2			3		
168	166	1		1	1				3	3	2	2	3	3	2			3		
169	167	1																		
170	168	1																		
171	169	1																		
172	170	1		1	1	1			3	4	3	3	3	5	2	2		3	3	
173	171	1		1	1	1			3	4	3	3	3	5	2	2		3	3	
174	172	1		1	1	1			3	4	3	3	3	5	2	2		3	3	
175	173	1		1	1	1			3	4	2	3	3	5	2	2		3	3	
176	174	1		1	1	1			3	4	2	3	3	5	2	2		3	3	
177	175	1		1	1				3	4	2	2	3	5	2			3		
178	176	1		1	1	1			3	4	3	3	3	5	2	2		3	3	
179	177	1		1	1	1			3	4	3	3	3	5	2	2		3	3	
180	178	1		1	1	1			3	4	3	3	3	5	2	2		3	3	
181	179	1		1	1	1			3	4	3	3	3	5	2	2		3	3	
182	180	1		1	1				3	4	2	2	3	5	2			3		
183	181	1		1	1				3	4	2	2	3	5	2			3		
184	182	1		1					3	4	2	2	3	5	2			3		
185	183	1																		
186	184	1																		
187	185	1																		
188	186	1																		
189	187	1																		
190	188	1																		
191	189	1																		
192	190	1																		
193	191	1																		
194	192	1																		
195	193	1																		
196	194	1																		
197	195	1																		
198	196	1																		
199	197	1																		
200	198	1																		
201	199	1																		

SCORE NOTE

For Compensation & Construction:

Blank = Not started yet

Highlight = On going; 1 = done

For Environmental Mitigation & OHS:

5=Very Good; 4=Good; 3=Fair; 2=Poor; 1=Very poor.

Appendix**1.1.2. Summary of Environmental and Health & Safety Performance of 275/150 kV Bengkayang substation.**

No	Project works category	Environmental Mitigation and Health & Safety							
		Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	OHS	Public H&S
1	Land clearing	3	3	3	3	3	3	2	3
2	Land preparation	3	3	3	3	3	2	2	3
3	Foundation and subsoil structure works	4	4	3	3	3	3	3	3
4	Metal works								
5	Installation								
6	Testing and commissioning								

Score For Environmental Mitigation & OHS:

5=Very Good; 4=Good; 3=Fair; 2=Poor; 1=Very poor.

Appendix:**1.1.3. Summary of Construction Progress, Environmental and Health & Safety performance of 150 kV Bengkayang –Ngabang- Tayan Transmission Line****A. Bengkayang –Ngabang Section**

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Waer quaity	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
1	1A																			
2	2A																			
3	3A																			
4	4A																			
5	5A																			
6	6A																			
7	7A																			
8	4																			
9	5																			
10	6																			
11	7																			
12	8																			
13	9																			
14	10																			
15	11																			
16	12																			
17	13																			
18	14																			
19	15																			
20	16																			
21	17																			

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
22	18																			
23	19																			
24	20																			
25	21																			
26	22																			
27	23																			
28	24																			
29	25																			
30	26																			
31	27																			
32	28																			
33	29																			
34	30																			
35	31																			
36	32																			
37	33																			
38	34																			
39	35	1																		
40	36	1																		
41	37	1																		
42	38	1																		
43	39																			
44	40	1																		
45	41	1																		
46	42	1																		
47	43																			
48	44	1																		
49	45	1																		
50	46																			
51	47	1																		
52	48	1																		
53	49	1																		
54	50	1																		
55	51	1																		
56	52	1																		
57	53	1																		
58	54	1																		
59	55	1																		
60	56	1																		
61	57	1																		
62	58	1																		
63	59	1																		
64	60	1																		
65	61	1																		
66	62	1																		
67	63	1																		
68	64	1																		
69	65	1																		
70	66	1																		
71	67	1																		
72	68	1																		
73	69	1																		
74	70	1																		

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
75	71	1																		
76	72	1																		
77	73	1																		
78	74	1																		
79	75	1																		
80	76	1																		
81	77	1																		
82	78	1																		
83	79	1																		
84	80	1		1	1				4	3	3	3	3	3				3		
85	81	1		1	1				4	3	3	3	3	3				3		
86	82	1																		
87	83	1																		
88	84	1																		
89	85	1																		
90	86	1																		
91	87	1																		
92	88																			
93	89	1																		
94	90	1																		
95	91	1																		
96	92																			
97	93	1																		
98	94	1																		
99	95	1																		
100	96	1																		
101	97	1																		
102	98	1																		
103	99	1																		
104	100	1																		
105	101	1																		
106	102	1																		
107	103	1																		
108	104	1																		
109	105	1																		
110	106	1																		
111	107	1																		
112	108	1																		
113	109	1																		
114	110	1																		
115	111	1																		
116	112	1																		
117	113	1																		
118	114																			
119	115	1																		
120	116	1																		
121	117	1																		
122	118	1																		
123	119	1																		
124	120	1																		
125	121	1																		
126	122	1																		
127	123	1																		

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
128	124	1																		
129	125	1																		
130	126	1																		
131	127																			
132	128	1																		
133	129	1																		
134	130	1																		
135	131	1																		
136	132	1																		
137	133	1																		
138	134	1																		
139	135	1																		
140	136	1																		
141	137	1																		
142	138	1																		
143	139	1																		
144	140	1																		
145	141	1																		
146	142	1																		
147	143	1																		
148	144	1																		
149	145	1																		
150	146	1																		
151	147	1																		
152	148	1																		
153	149	1																		
154	150	1																		
155	151	1																		
156	152	1																		
157	153	1																		
158	154	1																		
159	155	1																		
160	156	1																		
161	157	1																		
162	158	1																		
163	159	1																		
164	160	1																		
165	161	1																		
166	162	1																		
167	163	1																		
168	164	1																		
169	165	1																		
170	166	1																		
171	167	1																		
172	168																			
173	169																			
174	170	1																		
175	171																			
176	172	1																		
177	173	1																		
178	174	1																		
179	175	1																		
180	176	1							4	3	3	2	3	3	2			3		

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
181	177	1		1	1				4	3	3	2	3	3	2			3		
182	178	1		1	1				4	3	3	2	3	3	2			3		
183	179	1		1	1				4	3	3	2	3	3	2			3		
184	180	1																		
185	181	1																		
186	182	1																		
187	183	1																		
188	184	1																		
189	185	1																		
190	186	1																		
191	187	1																		
192	188	1																		
193	189	1																		
194	190	1																		
195	191	1																		
196	192	1																		
197	193	1																		
198	194	1																		
199	195	1																		
200	196	1																		
201	197	1																		
202	198	1																		
203	199	1																		
204	200	1																		
205	201	1																		
206	202	1																		
207	203	1																		
208	204	1																		
209	205	1																		
210	206	1																		
211	207	1																		
212	208	1																		
213	209	1																		
214	210	1																		
215	211	1																		
216	212	1																		
217	213																			
218	214																			
219	215																			
220	216																			
221	217																			
222	218																			
223	219																			
224	220	1																		
225	221	1																		
226	222																			
227	223																			
228	224																			
229	225	1																		
230	226	1																		
231	227	1																		
232	228	1																		
233	229	1																		

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
234	230																			
235	231	1																		
236	232	1																		
237	233	1																		
238	234	1																		
239	235	1																		
240	236																			
241	237																			
242	238																			
243	239																			
244	240																			
245	241																			
246	242																			
247	243																			
248	244																			
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250	246																			
251	247																			
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253	249																			
254	250																			
255	251																			
256	252																			
257	253																			
258	254																			
259	255																			
260	256																			
261	257																			
262	258																			
263	259																			
264	260																			
265	261																			
266	262																			
267	263																			
268	264																			
269	265																			
270	266																			
271	267																			
272	268																			
273	269	1																		
274	270	1																		
275	271																			
276	272																			
277	273																			
278	274																			
279	275																			
280	276																			

SCORE NOTE

For Compensation & Construction:

Blank = Not started yet

Highlight = On going; 1 = done

For Environmental Mitigation & OHS:

5=Very Good; 4=Good; 3=Fair; 2=Poor; 1=Very poor.

B. Ngabang-Tayan section

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
1	1																			
2	2																			
3	3																			
4	4																			
5	5																			
6	6																			
7	7																			
8	8																			
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18	18																			
19	19																			
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21	21																			
22	22																			
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24	24																			
25	25																			
26	26																			
27	27																			
28	28																			
29	29																			
30	30																			
31	31																			
32	32																			
33	33																			
34	34																			
35	35																			
36	36																			
37	37																			
38	38																			
39	39																			
40	40																			
41	41																			
42	42																			
43	43																			
44	44																			
45	45																			
46	46																			
47	47																			
48	48																			
49	49																			
50	50																			

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
51	51																			
52	52																			
53	53																			
54	54																			
55	55																			
56	56																			
57	57																			
58	58																			
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61	61	1																		
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67	67	1																		
68	68	1																		
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70	70	1																		
71	71	1																		
72	72	1																		
73	73	1																		
74	74	1																		
75	75	1																		
76	76	1																		
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78	78	1																		
79	79	1																		
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95	95																			
96	96																			
97	97																			
98	98																			
99	99																			
100	100	1																		
101	101	1																		

No (Sequential)	No. Tower	Compens. Payment		Construction					Environmental Mitigation						OHS			Public H&S		
		Tower site	ROW	Soil works	Concreting	Erection	Insulator install.	Stringing	Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	Foundation	Erection	Stringing	Foundation	Erection	Stringing
102	102	1																		
103	103	1							3	3	3	2	3	3	2	2		3		
104	104	1																		
105	105	1		1					3	3	3	2	3	3	2	2		3		
106	106	1		1					3	3	3	2	3	3	2	2		3		
107	107	1																		
108	108	1																		
109	109	1																		
110	110	1																		
111	111																			
112	112																			
113	113																			
114	114																			
115	115																			
116	116																			

SCORE NOTE:

For Compensation & Construction:

Blank = Not started yet

Highlight = On going: 1 = done

For Environmental Mitigation & OHS:

5=Very Good; 4=Good; 3=Fair; 2=Poor; 1=Very poor.

Appendix

1.1.4. Summary of Environmental and Health & Safety Performance of 150 kV Ngabang and Tayan Substations

A. 150/20 kV NGABANG SUBSTATION

No	Project works category	Environmental Mitigation and Health & Safety							
		Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	OHS	Public H&S
1	Land clearing	3	3	3	3	3	3	3	3
2	Land preparation	3	3	2	3	-	3	3	3
3	Foundation and subsoil structure works								
4	Metal works								
5	Installation								
6	Testing and commissioning								

Score For Environmental Mitigation & OHS:

5=Very Good; 4=Good; 3=Fair; 2=Poor; 1=Very poor.

B. 150 kV TAYAN SUBSTATION EXTENSION

No	Project works category	Environmental Mitigation and Health & Safety							
		Air quality	Water quality	Soil protection	Trash & Debris	Biodiversity	Loc. Employment	OHS	Public H&S
1	Land clearing	3	3	3	3	3	3	3	3
2	Land preparation	3	3	3	3	3	3	3	3
3	Foundation and subsoil structure works	4	4	3	3	3	3	2	3
4	Metal works								
5	Installation								
6	Testing and commissioning								

Score For Environmental Mitigation & OHS:

5=Very Good; 4=Good; 3=Fair; 2=Poor; 1=Very poor.

Appendix

1.2. [Mitigation Compliance Inspection Monitoring](#)⁽²⁾

Appendix

1.2.1. [Site Environmental Compliance Inspection and Monitoring of Package 1](#)

Project	: West Kalimantan Power Grid Strengthening Project(RRP INO 41074)	Implementing Agency	: PLN UPK 5, UIP X
Sub-Project	: 275 kV Bengkayang-Jagoibabang Transmission Line	Monitoring Agency	: PLN UIP X
Location	: Districts of Lumar, Ledo, Sanggau Ledo, Seluas	Enforcement Agency	: Ministry of Environment; Bapedalda West Kalimantan
Monitoring Period	: 15 Feb – 30June2014	Contractor(s)	: Bukaka Teknik Utama
Date	: End of June 2014	Implementation Phase	: Construction

(1). Contractor(s)

Contractor(s) Environmental Awareness	Yes / No	Actions Required	Contractor Response / Comment
Contractor(s) aware of mitigation requirements?	No	Bukaka to provide awareness of EMP to the subcontractors and the labors	
Contractor(s) have a copy of EMP?	No	Bukaka to provide EMP in site office. Bukaka to provide Simple Works Instruction Procedure to the labors	

² Refer to APPENDIX F. Initial Environmental Examination, July 2011. West Kalimantan Power Grid Strengthening Project (RRP INO 41074).

(2). Mitigation Compliance Inspection

No	Impact / Mitigation Measure (From EMP)	Mitigations Implemented (Yes, No)	Mitigations Effective? (1 to 5)*	Impact Observed / Location	Action Required	Contractor Response / Comment	Endorsed by:	
							Implementing Agency	Monitoring Agency
1	Vegetation clearing	Yes	Yes	TA-T186				
2	Soil erosion	No	2	TA-T186	Determines the tower location to be agreed with			
3	Drainage	No	3	TA-T186	Determines the tower location to be agreed with			
4	Acid sulphate soils	-	-	TA-T186				
5	Water quality impacts	Yes and No	3	TA-T186				
6	Air quality impacts	Yes	4	TA-T186				
7	Construction waste management	Yes and No	3	TA-T186	Cleaning whole construction waste			
8	Domestic waste management	No	2	TA-T186	Cleaning whole domestic waste			
9	Roads and infrastructure impacts	Yes	4	TA-T186				
10	Encroachment into protected forests, hunting, wood collection	-	-	T11-T149 and T194-199	The works at those location have not started yet.			
11	Occupational health and safety	No	2	TA-T186	Awareness for workers and supervisors			
12	Community health and safety	Yes and No	3	TA-T186	Awareness for workers and supervisors			
13	Employment opportunities	Yes	4	TA-T186				
14	Physical cultural resources	-	-	TA-T186				

*) **Mitigation Effectiveness Rating Criteria:** **(5). Very Good** (all required mitigations implemented); **(4) Good** (the majority of required mitigations implemented); **(3). Fair** (some mitigations implemented); **(2). Poor** (few mitigations implemented); **(1). Very Poor** (very few mitigations implemented)

(3). Environmental Incidents During Reporting Period (if relevant)

Environmental Incidents (accidents, spills, complaint)	Date / Location	Reported by	Description/ Location	Action Taken	Further Action Required	Endorsed by:	
						Implementing Agency	Monitoring Agency

(4).Summary of Actions Required and Follow-up (if relevant)

Action Required	Timeframe (e.g. within one week)	Responsible Parties	Follow-up (to be completed if inspection/monitoring indicates actions are required)
			Required Action Taken:
			Effectiveness:
			Further Action Required?:
			Prepared by:
			Date:

Inspection Completed by:.....

Date:.....

Signature:.....

Attachments: (e.g. notes, photographs)

Appendix

1.2.2. [Site Environmental Compliance Inspection and Monitoring of Package 2.](#)

Project : West Kalimantan Power Grid Strengthening Project(RRP INO 41074)	Implementing Agency : PLN UPK 5, UIP X
Sub-Project : 275/150/20 kV Bengkayang Substation	Monitoring Agency : PLN UIP X
Location : Magmagan, Bengkayang	Enforcement Agency : Ministry of Environment; Bapedalda West Kalimantan
Monitoring Period : 15 Feb – 30 June 2014	Contractor(s) : CG Consortium
Date : End of June 2014	Implementation Phase : Construction

(1). Contractor(s)

Contractor(s) Environmental Awareness	Yes / No	Actions Required	Contractor Response / Comment
Contractor(s) aware of mitigation requirements?	No	CG Consortium to provide awareness of EMP to the subcontractors and the labors	
Contractor(s) have a copy of EMP?	No	CG Consortium to provide EMP in site office. CG Consortium to provide Simple Works Instruction Procedure to the labors	

(2). Mitigation Compliance Inspection

No	Impact / Mitigation Measure (From EMP)	Mitigations Implemented (Yes, No)	Mitigations Effective? (1 to 5)*	Impact Observed / Location	Action Required	Contractor Response / Comment	Endorsed by:	
							Implementing Agency	Monitoring Agency
1	Vegetation clearing	Yes	Yes	Bengkayang Substation				
2	Soil erosion	Yes/No	3					
3	Drainage	Yes/No	3					
4	Acid sulphate soils	-	-		None			
5	Water quality impacts	Yes and No	3					
6	Air quality impacts	Yes	4					
7	Construction waste management	Yes and No	4		Cleaning whole construction waste			
8	Domestic waste management	Yes and No	3		Cleaning whole domestic waste			
9	Roads and infrastructure impacts	Yes	4					
10	Encroachment into protected forests, hunting, wood collection	-	-		No forest affected. Not applied.			
11	Occupational health and safety	Yes and No	3		Awareness for workers and supervisors			
12	Community health and safety	Yes and No	3		Awareness for workers and supervisors			
13	Employment opportunities	Yes and No	3					
14	Physical cultural resources	-	-					

*) **Mitigation Effectiveness Rating Criteria** : **(5). Very Good** (all required mitigations implemented); **(4) Good** (the majority of required mitigations implemented); **(3). Fair** (some mitigations implemented) ; **(2). Poor** (few mitigations implemented) ; **(1). Very Poor** (very few mitigations implemented)

(3). Environmental Incidents during Reporting Period (if relevant)

Environmental Incidents (accidents, spills, complaint)	Date / Location	Reported by	Description/ Location	Action Taken	Further Action Required	Endorsed by:	
						Implementing Agency	Monitoring Agency

(4).Summary of Actions Required and Follow-up (if relevant)

Action Required	Timeframe (e.g. within one week)	Responsible Parties	Follow-up (to be completed if inspection/monitoring indicates actions are required)
			Required Action Taken:
			Effectiveness:
			Further Action Required?:
			Prepared by:
			Date:

Inspection Completed by:.....

Date:.....

Signature:.....

Attachments: (e.g. notes, photographs)

Appendix

1.2.3. [Site Environmental Compliance Inspection and Monitoring of Package 3.](#)

Project : West Kalimantan Power Grid Strengthening Project (RRP INO 41074)	Implementing Agency : PLN UPK 5, UIP X
Sub-Project : 150 kV Bengkayang-Ngabang-Tayan Transmission Line	Monitoring Agency : PLN UIP X
Location : Bengkayang, Landak and Sanggau Regencies	Enforcement Agency : Bapedalda of West Kalimantan Bapedalda of Bengkayang Bapedalda of Landak Bapedalda of Sanggau
Monitoring Period : 15 Feb – 30 June 2014	Contractor(s) : Consortium of KEC International Limited and Mitsubishi Corporation
Date : End of June 2014	Implementation Phase : Preparation for Construction

(1). Contractor(s)

Contractor(s) Environmental Awareness	Yes / No	Actions Required	Contractor Response / Comment
Contractor(s) aware of mitigation requirements?	No	KEC & Mitsubishi Consortium to provide awareness of EMP to the subcontractors and the labors	-
Contractor(s) have a copy of EMP?	No	KEC & Mitsubishi Consortium to provide EMP in site office. KEC & Mitsubishi Consortium to provide Simple Works Instruction Procedure to the labors	-

(2). Mitigation Compliance Inspection

No	Impact / Mitigation Measure (From EMP)	Mitigations Implemented (Yes, No)	Mitigations Effective? (1 to 5)*	Impact Observed / Location	Action Required	Contractor Response / Comment	Endorsed by:	
							Implementing Agency	Monitoring Agency
1	Vegetation Clearing	Yes	Yes	T176-179				
2	Soil Erosion	Yes/No	3	T176-179	Determines the tower location to be agreed with			
3	Drainage	Yes/No	3	T176-179	Determines the tower location to be agreed with			
4	Acid Sulphate Soils	-	-	T176-179	None			
5	Water Quality Impacts	Yes and No	3	T176-179				
6	Air Quality Impacts	Yes	4	T176-179				
7	Construction Waste Management	Yes and No	4	T176-179	Cleaning whole construction waste			
8	Domestic Waste Management	Yes and No	3	T176-179	Cleaning whole domestic waste			
9	Roads and Infrastructure Impacts	Yes	4	T176-179				
10	Encroachment into Protected Forests, Hunting, Wood Collection	-	-	T176-179	No forest affected. Not applied.			
11	Occupational Health and Safety	Yes and No	2	T176-179	Awareness for workers and supervisors			
12	Community Health and Safety	Yes and No	3	T176-179	Awareness for workers and supervisors			
13	Employment Opportunities	Yes and No	3	T176-179				
14	Physical Cultural Resources	-	-	T176-179				

*) **Mitigation Effectiveness Rating Criteria**

(5). Very Good (all required mitigations implemented); **(4) Good** (the majority of required mitigations implemented); **(3). Fair** (some mitigations implemented); **(2). Poor** (few mitigations implemented); **(1). Very Poor** (very few mitigations implemented)

(3). Environmental Incidents during Reporting Period (if relevant)

Environmental Incidents (accidents, spills, complaint)	Date / Location	Reported by	Description/ Location	Action Taken	Further Action Required	Endorsed by:	
						Implementing Agency	Monitoring Agency

(4).Summary of Actions Required and Follow-up (if relevant)

Action Required	Timeframe (e.g. within one week)	Responsible Parties	Follow-up (to be completed if inspection/monitoring indicates actions are required)
			Required Action Taken:
			Effectiveness:
			Further Action Required?:
			Prepared by:
			Date:

Inspection Completed by:.....

Date:

Signature:

Attachments: (e.g. notes, photographs)

Appendix

1.2.4. [Site Environmental Compliance Inspection and Monitoring of Package 4.](#)

Project : West Kalimantan Power Grid Strengthening Project(RRP INO 41074)	Implementing Agency : PLN UPK 5, UIP X
Sub-Project : 150/20 kV Ngabang & Tayan Substation	Monitoring Agency : PLN UIP X
Location : Ngabang and Tayan	Enforcement Agency : Bapedalda of West Kalimantan Bapedalda of Landak Bapedalda of Sanggau
Monitoring Period : 15 Feb – 30 June 2014	Contractor(s) : PT. Siemens Indonesia
Date : End of June 2014	Implementation Phase : Construction

(1). Contractor(s)

Contractor(s) Environmental Awareness	Yes / No	Actions Required	Contractor Response / Comment
Contractor(s) aware of mitigation requirements?	No	PT. Siemens Indonesia to provide awareness of EMP to the subcontractors and the labors	
Contractor(s) have a copy of EMP?	No	PT. Siemens Indonesia to provide EMP in site office. PT. Siemens Indonesia to provide Simple Works Instruction Procedure to the labors	

(2). Mitigation Compliance Inspection

No	Impact / Mitigation Measure (From EMP)	Mitigations Implemented (Yes, No)	Mitigations Effective? (1 to 5)*	Impact Observed / Location	Action Required	Contractor Response / Comment	Endorsed by:	
							Implementing Agency	Monitoring Agency
1	Vegetation clearing	Yes	Yes	Ngabang & Tayan Substations				
2	Soil erosion	Yes/No	3					
3	Drainage	Yes	2		Drainage in adjacent with the road side area at Ngabang SS needs to be immediately developed			
4	Acid sulphate soils	-	-		None			
5	Water quality impacts	Yes and No	3					
6	Air quality impacts	Yes	4					
7	Construction waste management	Yes and No	4		Cleaning whole construction waste			
8	Domestic waste management	Yes and No	3		Cleaning whole domestic waste			
9	Roads and infrastructure impacts	Yes	4					
10	Encroachment into protected forests, hunting, wood collection	-	-		No forest affected. Not applied.			
11	Occupational health and safety	Yes and No	2		Awareness for workers and supervisors			
12	Community health and safety	Yes and No	3		Awareness for workers and supervisors			
13	Employment opportunities	Yes and No	3					
14	Physical cultural resources	-	-					

*) **Mitigation Effectiveness Rating Criteria :** (5). **Very Good** (all required mitigations implemented); (4) **Good** (the majority of required mitigations implemented); (3). **Fair** (some mitigations implemented) ; (2). **Poor** (few mitigations implemented) ; (1). **Very Poor** (very few mitigations implemented)

(3). Environmental Incidents During Reporting Period (if relevant)

Environmental Incidents (accidents, spills, complaint)	Date / Location	Reported by	Description/ Location	Action Taken	Further Action Required	Endorsed by:	
						Implementing Agency	Monitoring Agency

(4).Summary of Actions Required and Follow-up (if relevant)

Action Required	Timeframe (e.g. within one week)	Responsible Parties	Follow-up (to be completed if inspection/monitoring indicates actions are required)
			Required Action Taken:
			Effectiveness:
			Further Action Required?:
			Prepared by:
			Date:

Inspection Completed by:.....

Date:.....

Signature:.....

Attachments: (e.g. notes, photographs)

APPENDIX

2. AMBIENT MONITORING RESULTS

To be provided later after receiving the monitoring result of RKL-RPL Monitoring conducted by other consultant appointed by PLN

APPENDIX:

3. PHOTOGRAPHS

3.1. Bengkayang – Jagoibabang Transmission lines



No of Picture: 1
Route: 275 kV Bengkayang-Jagoibabang
No of Tower: 74
Location: Ledo
Status: Tower erection finished
Picture taken: April29, 2014
Problem: Scattered construction waste must be removed



No of Picture: 2
Route: 275 kV Bengkayang-Jagoibabang
No of Tower: 150
Location: Seluas subdistrict
Status: Foundation works
Picture taken: Feb. 24, 2014
Problem: Encroaching community forest, cut trees for building access path.
Note: The pathway access made of cutting trees from community forest. In the background sacks of sand, stones and cement as materials of concrete works.



No of Picture: 3
Route: 275 kV Bengkayang-Jagoibabang
No of Tower: 68
Location: Ledo subdistrict
Status: Foundation construction
Picture taken: Feb. 24, 2014
Problem: Tower located in steep slope (see the road below). Note: The picture beneath was the same location but it was taken from different angle



No of Picture: 4
Route: 275 kV Bengkayang-Jagoibabang
No of Tower: 68
Location: Ledo subdistrict
Status: Tower erection finished
Picture taken: April 29, 2014
Problem: Potential for soil erosion of tower located in steep slope Note: The picture above was the same location but it was taken from different angle



No of Picture: 5
Route: 275 kV Bengkayang-Jagoibabang
Location: see below
Status: Erection tower finished
Picture taken: June 24, 2014

Note:

- Left: Tower 94 covered with maize planted by local people.
 - Right: Tower 97 covered with grass.
- For the erosion point of view the vegetation is good for erosion protection



No of Picture: 6 & 7
Route: 275 kV Bengkayang-Jagoibabang
Location: see below
Status: Foundation works
Picture taken: June 24, 2014

Note:

- **Left:** T. 67 foundation with bore pile system. Mud pond of tower boring machine was frequently overtopped and it flowed to surrounding wood. Impact was insignificant, it could easily be absorbed by surrounding landscape.
- **Right:** T. 77 foundation with SMCF system, produce intermittently very loud sound, SMCF is abbreviation of steel mortar composite foundation. It was located in mixed garden remote from dwelling area.



No of Picture: 8 & 9
Route: 275 kV Bengkayang-Jagoibabang
Location: Ledo sub district
Status: Tower erected
Picture taken: June 24, 2014

Note:

- Left: Serial of towers T-68, T-69, T-70, T-71 and T-72
- Right: T.129. Insulators installed

3.2. Bengkayang Substation



No of Picture: 10
Route: 275/150/20 kV Bengkayang Substation
Location: 275 kV Substation site
Status: -
Picture taken: March 28, 2014
Note: Land preparation has been completed, the civil structure works have not been initiated yet



No of Picture: 11
Route: 275/150/20 kV Bengkayang Substation
Location: 150/20 KV Substation site
Status: Foundation works
Picture taken: June 6, 2014

Note:
Retaining wall construction of 150/20 KV Bengkayang Substation site



No of Picture: 12
Route: 275/150/20 kV Bengkayang Substation
Location: 275 and 150 KV Substation sites
Status: Foundation works
Picture taken: Right: June 6, 2014 Left: June 24, 2014

Note:
Left: 150 kV area:Construction of foundation

Note:
Right: 275 kV area:Construction has been not initiated yet.

3.3. 150 kV Bengkayang- Ngabang-Tayan transmission line:

a. Bengkayang – Ngabang transmission line



No of Picture: 14
Route: 150 kV Bengkayang- Ngabang
No of Tower: 177
Location: Young rubber plantation at Antan Raya village
Status: -
Picture taken: April 17, 2014
Note: The workers pouring the concrete for the column of the tower's leg

Note: Thexx



No of Picture: 15
Route: 150 kV Bengkayang- Ngabang
No of Tower: 81
Location: Banyukehulu village, Landak Subdistrict
Status: Foundation Construction
Picture taken: June 3, 2014
Note: Foundation excavation has been finished, rebar of tower pad was being installed

b. Ngabang – Tayan Transmission lines



No of Picture: 16

Route:
150 kV Ngabang-Tayan

No of Tower: T 106

Location: Tebedak Village,
Ngabang

Status: Foundation works

Picture taken:
May 31, 2014

Note: Land Excavation has
been finished.
Sand and gravel in hemp
sacks ready for construction



No of Picture: 17

Route:
150 kV Ngabang-Tayan

No of Tower: T 105

Location: Tebedak
Village, Ngabang

Status: Foundation works

Picture taken:
May 31, 2014

Note: Land Excavation has
been finished.

3.4. 150/20 kV Ngabang and Tayan substations:

b) 150/20 kV Ngabang substation



No of Picture: 18
Location: New Ngabang substation
Status: -
Picture taken: Feb. 21, 2014

Note:

Site of New Ngabang substation. The road in the picture is the Pontianak – Tayan – Ngabang main road



No of Picture: 19
Location: New Ngabang substation
Status: The land and vegetation have been compensated and land preparation has been completed
Picture taken: April. 20, 2014

Note:

There is no retaining wall and drainage along the roadside (Pontianak – Tayan – Ngabang main road). This causes the sediment of soil erosion to overflow on the road.



No of Picture: 20
Location: New Ngabang substation
Status: Retaining wall at road side under construction
Picture taken: April. 20, 2014

Note:

Retaining wall was being constructed without drainage along the roadside (Pontianak – Tayan – Ngabang main road). This causes the sediment of soil erosion overflow on the road.

c) 150/20 kV Tayan substation



No of Picture: 21

Location: Tayan substation

Status: Construction

Picture taken:
April. 21, 2014

Note:

The 150/20 kV Tayan substation is constructed in the area adjacent to the existing substation



No of Picture: 22

Location: Tayan substation

Status: Construction

Picture taken:
April. 21, 2014

Note:
Suspended soil erosion
in drainage canal

3.5. Photographs of Health and Safety Issues



No of Picture: 23

Route: 275 kV Bengkayang-Jagoibabang

No of Tower: 069

Location: Jesape Village

Status: Foundation works

Picture taken: Jan. 16, 2014

Note: The workers did not wear personnel protection equipment (Helmet, shoes, safety harness)



No of Picture: 24

Route: 275 kV Bengkayang-Jagoibabang

No of Tower: 137

Location: Mayak Village, Seluas Subdistrict

Status: Tower erection

Picture taken: April 17, 2014

Note:
The workers were manually rotating the pulley for elevating the assembled steel members. They wore safety shoes but some did not wear helmet, and some of them did not wear gloves.



No of Picture: 25

Route: 275 kV
Bengkayang- Jagoibabang

No of Tower: 166

Location: Seluas Village

Status: Tower Material
mobilization

Picture taken: April. 24,
2014

Note: The local people transported the materials for concrete works using motorcycle, they did not wear proper personal protective equipment such as helmet and Safety shoes



No of Picture: 26

Route: 275 kV Bengkayang-
Jagoibabang

No of Tower: 137

Location: Mayak Village,
Seluas Subdistrict

Status: Tower erection

Picture taken: April 17, 2014

Note: The workers did not wear proper personal protective equipment such as helmet, body harness and gloves

APPENDIX:

4. CONTRACTUAL ENVIRONMENTAL REQUIREMENTS OF EACH PACKAGE.

4.1. PACKAGE 1: 275 KV BENGKAYANG – JAGOIBABANG TRANSMISSION LINE⁽³⁾

Section VII Special

Section 8 - Special Conditions of Contract Conditions

Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC. The clause number of the SCC is the corresponding clause number of the GCC (Page 8-1).

Clause 46. Protection of the Environment (Page 8-6)

- The Contractor shall comply with all applicable national, provincial, and local environmental laws and regulations.
- The Contractor shall:
 - a. establish an operational system for managing environmental impacts,
 - b. carry out all of the monitoring and mitigation measure set forth in the Initial Environmental Examination (IEE) or Environmental Management Plan (EMP), and
 - c. allocate the budget required to ensure such measures are carried out.
- The Contractor shall submit semi-annual reports on the carrying out of such measure to the Employer.
- More particularly, the Contractor shall comply with:
 - (i) the measures and requirements set forth in the initial environmental examination and the environmental management plan attached hereto as Appendix 9; and
 - (ii) any corrective or preventive actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the initial environmental examination and the environmental management plan.
- The Contractor shall allocate a budget for compliance with these measures, requirements and actions

Addendum No. 1 of Bidding Document Package 1: 275 kV Bengkayang-Jagoibabang Transmission Line (September 2012)

Section 8: Special Conditions of Contract (Page 8-5 - R1)

Clause 35 . Unforeseen Conditions

Clause 35.3 (added at end of 35.3)

- In addition to notice of any Unforeseeable physical conditions, the Contractor shall provide the Project Manager with a written notice of any unanticipated environmental or resettlement risks or impacts that arise during construction, implementation or operation of the Plant or Permanent Works, which were not considered in the initial environmental examination, the environmental management plan or the resettlement plan attached hereto as Appendix 9 through Appendix 10 (*not attached in this report*)

³ Contract document No 001.PJ/611/DIR/2013 dated April 12th, 2013 between PT Perusahaan Umum Listrik Negara (Persero) and PT Bukaka Teknik Utama. Strengthening West Kalimantan Power Grid Project Loan ADB + AFD. Package 1: Design, Supply, Installation, Testing, and Commissioning of 275 kV Overhead Transmission Lines Bengkayang Substation – Jagoibabang Volume I – IV.

4.2. PACKAGE 2: 275/150 KV BENGKAYANG SUBSTATION⁽⁴⁾

VOLUME I of III, BOOK 2 of 2, April 2013

6.2.2. GENERAL TECHNICAL REQUIREMENT:

2.4 Environmental Considerations

The contractor shall comply with the following acts and regulations as follows:

- Act of Republic of Indonesia no. 23/1997, regarding Environmental Management
- Act of Republic of Indonesia no. 24/1992, regarding Spatial Use Management
- Degree of the Minister for Environmental of Republic of Indonesia No. KEP-28/MENLH/11/1996, regarding Noise Level Standards
-

The following are other environmental considerations for which the Contractor shall take due considerations.

Local Employment

The contractor shall make every endeavor to maximize the employment of people from the local villages of the site.

Earthworks

The Contractor shall ensure that stripped topsoil is stored for use later for landscaping and re-vegetation. The Contractor shall ensure that adequate and appropriate temporary silt ponds, site drainage and silt traps are constructed during earth works, especially in the rainy season to minimize the impact of silt/mud run off into local streams. The Contractor shall minimize the extent of vegetation stripping during earth works. At the completion of the main earth works the Contractor shall spread topsoil in open areas inside the site and re-vegetate such areas as appropriate.

Construction Traffic

The road to the site is narrow and passes through a village. There are a number of residents' houses and a school near the road. Therefore, in order to minimize construction traffic impact and ensure the safety of local people -in particular children - the Contractor shall schedule as best as practical the construction traffic through the villages so as to minimize impacts. Construction traffic shall be during the day except for large transportation items. The contractor shall install traffic signs around the villages and impose and strictly enforce a 20km/h speed limit for construction traffic in the vicinity of the site and village. All construction vehicles shall be maintained as to minimize their noise and exhaust pollution levels. The road in the vicinity of the site and the local village which is used for construction traffic shall be regularly water sprinkled by water truck to minimize the level of dust in the air around local villages.

Site Noise Control

All works shall be carried out without unreasonable noise. Welding generator and stringing motors used at site shall be silenced either by using only full silenced models fitted with effective exhaust silencers and properly lined and sealed acoustic covers or by the use of effective acoustic screen to enclose the noise source. Such equipment shall be maintained in good and efficient working order.

⁴Contract Document No. 0008.PJ/611/DIR/2013, Dated April 30th, 2013, between PT. Perusahaan Listrik Negara (PERSERO) and CG Consortium for Strengthening West Kalimantan Power Grid Project LOAN ADB + AFD Package 2 : Design, Supply, Installation, Testing, and Commissioning of 275/150 kV Bengkayang Substation

Public Morality

The Contractor shall be responsible for keeping discipline in the site and in this regard the Contractor shall pay attention to the public morality of his staff and laborers both on and off the site. In the interests of good community relations, the Contractor and his personnel shall be circumspect in their dealing with people residing in the neighborhood of the works and take steps to minimize any disturbance to them. The Contractor shall arbitrate any dispute arising between his personnel and persons in the neighborhood of the works.

Interference with Existing Water Courses

The Contractor shall not interfere with damage, contaminate and/or pollute any existing significant streams or rivers. The Contractor shall take all precautions not to affect the original condition. Direct discharge of construction waste water or contaminated water into the stream or river is not permitted. The Contractor shall provide adequate settling basins for construction works.

VOLUME I of III, BOOK 1 of 2, April 2013

SECTION 8. SPECIAL CONDITIONS OF CONTRACT (SCC)

46. Environmental Protection (page 8-6)

The Contractor shall comply with all applicable national, provincial, and local environmental laws and regulations.

The Contractor shall:

- (a) establish an operational system for managing environmental impacts,
- (b) carry out all the monitoring and mitigation measure set forth in the Initial Environmental Examination (IEE) or Environmental Management Plan (EMP), and
- (c) allocate the budget required to ensure such measures are carried out. The Contractor shall submit semi-annual reports on the carrying out of such measures to the Employer.

More particularly, the Contractor shall comply with (i) the measures and requirements set forth in the initial environmental examination and the environmental management plan attached hereto as Appendix 9; and (ii) any corrective or preventive actions set out in the safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the initial environmental examination and environmental management plan.

The Contractor shall allocate a budget for compliance with these measures, requirements and actions

ADDENDUMNO. 1

35. Unforeseen Conditions

35.3 (added to end of 35.3)

In addition to notice of any unforeseeable physical conditions, the Contractor shall provide the Project Manager with a written notice of any unanticipated environmental or resettlement risks or impact that arise during construction, implementation or operation of the Plant or Permanent Works, which were not considered in the initial environmental examination, the environmental management plan or the resettlement plan attached hereto as Appendix 9 through Appendix 10(*not added to this report*).

4.3. PACKAGE 3: 150 KV BENGKAYANG – NGABANG –TAYAN TRANSMISSION LINE⁵⁾

Section VI Addendum No. 1 of Bidding Document (September 2012)

Section 8 - Special Conditions of Contract (Page 8-5-R1)

Section VII: Special Conditions

Section 8 - Special Conditions of Contract

Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC. The clause number of the SCC is the corresponding clause number of the GCC (Page 8-1).

Section 8 - Special Conditions of Contract (Page 8-5)

Clause 35. Unforeseen Conditions

Clause 35.3. (added at end of 35.3)

In addition to notice to any unforeseen physical conditions, the Contractor shall provide the Engineer with a written notice of any unanticipated environmental or resettlement risks or impacts that arise during construction, implementation or operation of the Plant or Permanent Works, which were not considered in the initial environmental examination, the environmental management plan or the resettlement plan attached hereto as Appendix [B] through Appendix [D].

Clause 46. Protection of the Environment (Page 8-5 and 8-6)

- The Contractor shall comply with all applicable national, provincial, and local environmental laws and regulations.
 - The Contractor shall:
 - a. establish an operational system for managing environmental impacts,
 - b. carry out all of the monitoring and mitigation measure set forth in the Initial Environmental Examination (IEE) or Environmental Management Plan (EMP), and
 - c. allocate the budget required to ensure such measures are carried out.
 - The Contractor shall submit semi-annual reports on the carrying out of such measure to the Employer.
 - More particularly, the Contractor shall comply with:
 - (i) the measures and requirements set forth in the initial environmental examination and the environmental management plan attached hereto as Appendix [B and D]; and
 - (ii) any corrective or preventive actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the initial environmental examination and the environmental management plan.
- The Contractor shall allocate a budget for compliance with these measures, requirements and actions

⁵ Contract document No 0009.PJ/611/DIR/2013 dated April 30th, 2013 between PT Perusahaan Umum Listrik Negara (Persero) and Consortium of KEC International Limited and Mitsubishi Corporation.. Strengthening West Kalimantan Power Grid Project Loan ADB + AFD. Package 3: Design, Supply, Installation, Testing, and Commissioning of 150 kV Overhead Transmission Lines Bengkayang –Ngabang-Tayan. Volume I – III.

4.4. PACKAGE 4: 150/20 KV SUBSTATION AT NGABANG AND TAYAN⁽⁶⁾

BOOK I(1 of 8)

Section 8. Special Conditions of Contract (SCC) and Addendum No. 1 September, 2012

46. Environmental Protection

The Contractor shall comply with all applicable national, provincial, and local environmental laws and regulations.

- The Contractor shall:
 - (a) establish and operational system for managing environmental impacts,
 - (b) carry out all the monitoring and mitigation measure set forth in the Initial Environmental Examination (IEE) or Environmental Management Plan (EMP), and
 - (c) allocate the budget required to ensure such measures are carried out.
 - The Contractor shall submit semi-annual reports on the carrying out of such measure to the Employer.
 - More particularly, the Contractor shall comply with:
 - (i) the measures and requirements set forth in the initial environmental examination and the environmental management plan attached hereto as Appendix 9; and
 - (ii) any corective or preventive actions set out in the safeguards monitoring reports that the Employer will prepare from the time to time to monitor implementation of the initial environmental examination and enviromental managemement plan.
- The Contractor shall allocate a budget for compliance with these measures, requirements and actions.

⁶ Contract Agreement No. 0114.PJ/041/DIR/2013, Dated : August 1st , 2013 Between: PT. PLN (Persero) and PT. Siemens IndonesiaFOR Strengthening West Kalimantan Power Grid Project Loan ADB + AFD. Package 4 : Design, Supply, Installation, Testing, and Commissioning of 150/20 kV Substation at Ngabang and Tayan

APPENDIX:

5. LIST OF SUBMITTED ENVIRONMENTAL REPORTS

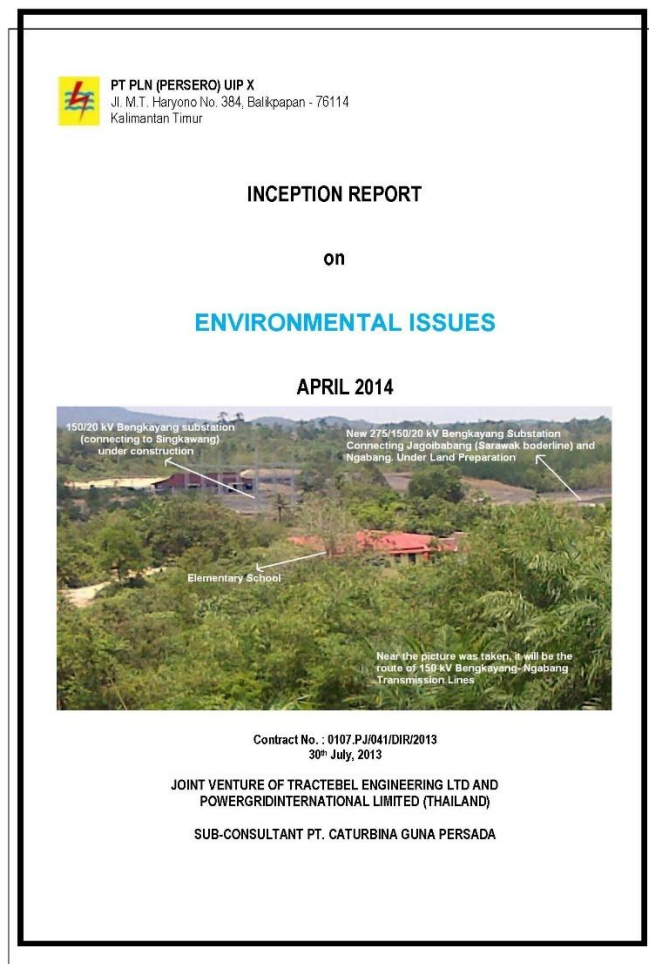
a) Inception Report

b) First Quarterly Report

c) Monthly Reports

- **March 2014 Project progress report Appendix 9. Environmental Issues.**
- **April 2014 Project progress report Appendix 9. Environmental Issues**
- **May 2014 Project progress report Attachment 10. Environmental Issues**
- **June 2014 Project progress report Attachment 10. Environmental Issues**

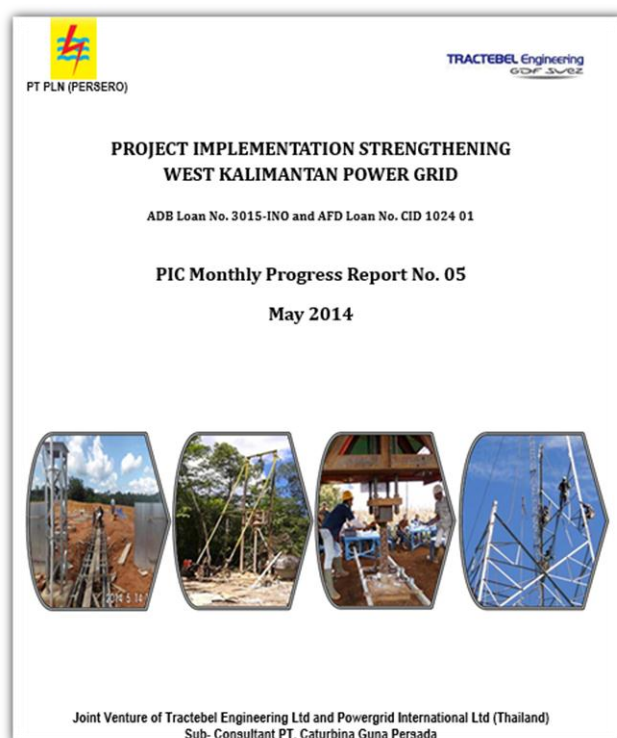
a) Inception Report



b) Quarterly Report



c) Monthly Report

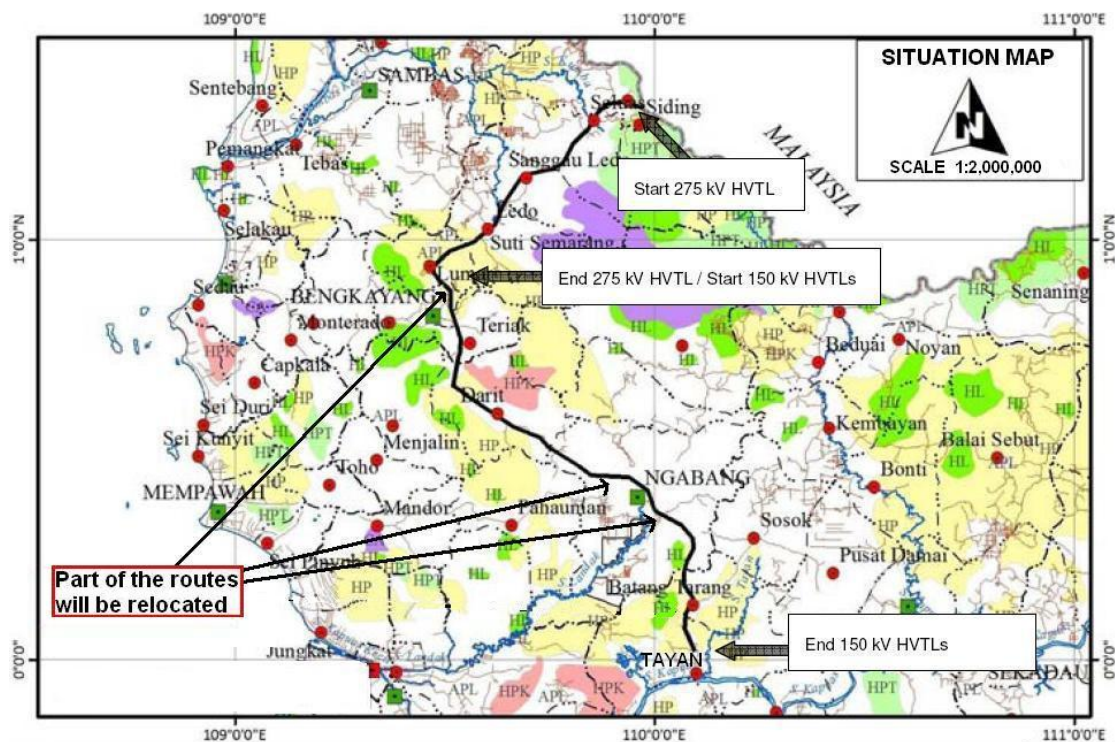


APPENDIX:**6. ENVIRONMENTAL REVIEW ON SUBSTATION RELOCATION AND TOWER REROUTES**

Comparing with the original schedule mentioned in IEE, there are some route changes due to relocating of the planned sites for 275/150/20 kV Bengkayang substation and 150/20 kV Ngabang substation.

The routes location are highlighted in the Map A-1 and the addition or elimination of towers as consequence of the site changes of both substations are discussed in the following paragraphs:

Map A-1 Situation map of re-route 275 kV Bengkayang – Jagoibabang and 150 kV Bengkayang – Ngabang – Tayan Transmission Lines



a) Tower reroutes and changes of tower locations of 275 kV Bengkayang–Jagoibabang Transmission Line

According to the original planning, this route comprises of 199 towers (Tower No 1 in Bengkayang to Tower No 199 in Jagoibabang). For the sake of synchronizing with the route of the 150 kV Singkawang-Bengkayang transmission line, the planned 275/150/20 kV Bengkayang substation originally located at the left side of road into direction to Jagoibabang, has been shifted to North-Eastern direction at right hand side of the road, located adjacent to 150/20 kV Bengkayang substation which is under construction and where the terminal of 150 kV Singkawang-Bengkayang Transmission Line will be.

- a.1) The six towers from No.1 to 6 will be eliminated, and replaced through four towers of No. A, B, C, D which will be erected to connect the 275 kV Bengkayang Substation (see Map A-1) with tower No.7 (Coordinate $X=331159.42$, $Y=10100704.350$). For the sake of mitigating of insufficient ground clearance of conductors, there are an additional four intermediate/insertion towers with No. 76A,

99A, 110A, and 158A to be constructed. So in total, there will be 201 towers, i.e. two additional towers on the 275 kV Bengkayang-Jagoiababang route.

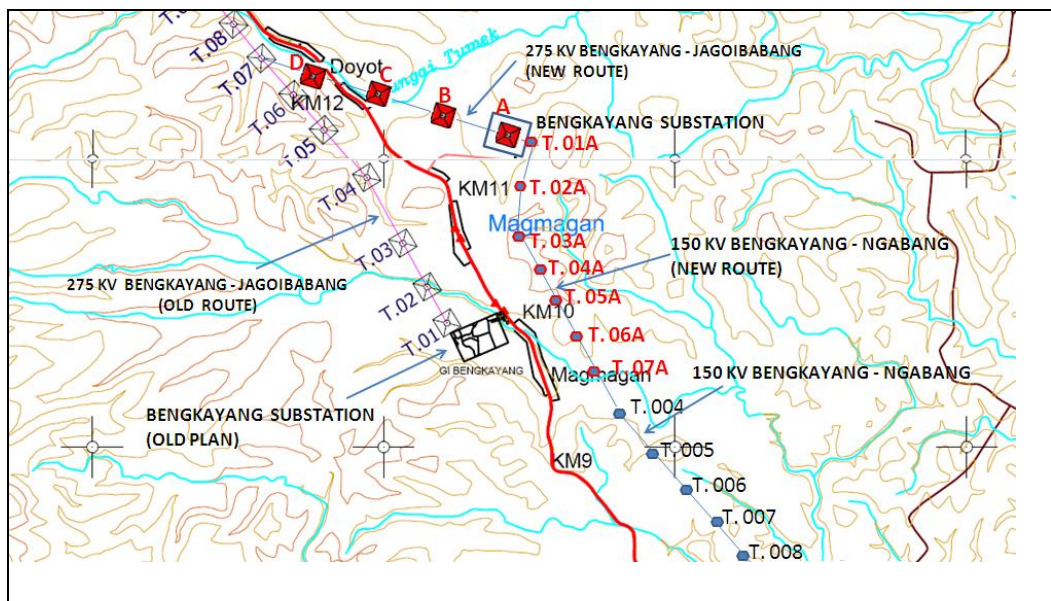
Table 1.1 TOWER CHANGES OF 275 KV BENGKAYANG – JAGOIBABANG Transmission Line

TOWER NUMBERS																																	
		A	B	C	D	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60				
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	76A	77	78	79	80	81	82	83	84	85	86	87	88	89	90			
91	92	93	94	95	96	97	98	99	99A	100	101	102	103	104	105	106	107	108	109	110	110A	111	112	113	114	115	116	117	118	119	120		
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150				
151	152	153	154	155	156	157	158	158A	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180			
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199															

■ Tower Changes

■ The 275/150/20 kV Bengkayang substation has been shifted to North-Eastern direction at right hand side of the road, located adjacent to 150/20 kV Bengkayang substation which will connect to the 150 kV Singkawang – Bengkayang transmission line. The towers connecting to it were relocated (4 sites) and eliminated 6 sites.

Map A-2 Tower re-routing of 275 kV Bengkayang – Jagoiababang and 150 kV Bengkayang - Ngabang Transmission Lines



Environmental review:

- The route to the new Bengkayang substation location will have less impact on forest land due to shorter distance of the Right of Way (ROW) but slightly more impact on rubber and palm oil plantation, and it will also add one more crossing of the main National Road of Bengkayang - Jagoiababang and electricity medium voltage lines. No major impact and no special environmental management measures are anticipated. During the construction of towers and stringing activities the environmental standard protection measures shall be applied and thereby eliminate the expected associated impact.
- Regarding the land use of the alignment which is rubber and palm oil plantation, in general, the prediction of potential impacts to be experienced by affected households due to the permanent land acquisition for the tower bases are minor. The towers on West Kalimantan side will be constructed higher than

those of International standard, so the farmers may cultivate the ROW area with the annual or perennial crops with its canopy up to 3 m in height.

- The impact on traffic due to main road crossing can be neglected because no traffic congestion is expected to be caused by stringing activities. Scaffolding as temporary protection made of bamboo at both side of the road will eliminate the traffic disturbance.
- a.2) The new 275/150 kV Bengkayang substation is developed adjacent to the new 150/20 kV substation of Bengkayang which is under construction where it will connect to the 150 kV Bengkayang-Singkawang Transmission Line. The landuse of the substation area is rubber plantation. The planned area is undulating and so it needs soil works to level the site. The higher soil level has been excavated to fill the lower level. No quarry from outside is needed for the embankment, all soil for embankment comes from the same area. At the time being, the construction works for 150 kV substation are underway.

Environmental review:

- Impact on erosion and polluting the water body is minimal because there is no significant creek or river in that area.
- No embankment for land preparation using soil/material from other location outside, thus no hauling truck going in/out carrying soil that may cause an impact on air quality such as fugitive dust and exhaust gas.
- No wild animal affected, since the area is rubber plantation and bushes.
- Close to the substation area at approximately 100-300 m, there is an elementary school, but without impact on children since there is no access for them to go to the site. Later the substation area will be fenced to protect anybody from entering the site.

b) Towerre-routes of 150 kV Bengkayang-Ngabang Transmission Line

According to the original plan, this route comprises of 260 towers (Tower No 1 in Bengkayang to Tower 260 in Ngabang). There are several modifications of the towers:

- Due to 275/150 kV Bengkayang Substation shifted North-Eastern, there will be the elimination of three towers (number 1 to 3) and addition of seven new towers (1A, 2A, 3A, 4A, 5A, 6A, and 7A). Tower 1A (X=332798, Y=100065); Tower 7A (X=333493, Y=98504) (see Map A-2).
- According to recalculation design regarding the conductor ground clearance, there will be four towers to be eliminated (Tower No. 54, 126, 157 and 158), but in addition there will be one tower to be inserted (Tower No. 24A).
- There will be seven towers to be shifted due to site relocation of 150/20 kV Ngabang Substation (see Map A-3.1).

Table 1.2. TOWER CHANGES OF 150 KV BENGKAYANG – NGABANG TRANSMISSION LINE

TOWER NUMBERS																														
1A	2A	3A	4A	5A	6A	7A	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20							
21	22	23	24	24A	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	
111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	
171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	
231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	

Note:

■ Tower Changes

■ Due to landuse problem on previously proposed Ngabang Substation, the towers connecting to it are planned to be relocated. (The new route survey has been completed but the report was not received yet).

Asto the new Ngabang substation is now closer to Tayan direction, towers 117 to 133 of Tayan- Ngabang Transmission Line have been considered to be added as of Bengkayang-Ngabang Transmission Line. Accordingly, the total number of towers of Bengkayang-Ngabang section will become 280.

b.1) Re-routes and addition of 7 new towers (1A, 2A, 3A, 4A, 5A, 6A, and 7A)

Environmental review:

Out of seven new additional tower sites of 150 kV Bengkayang – Ngabang Transmission Line, four towers will be constructed in parallel route to the 150 kV Bengkayang - Singkawang Transmission Line which currently is under construction. The later route is on the western side and the Bengkayang -Ngabang Transmission Line route is on the eastern side.

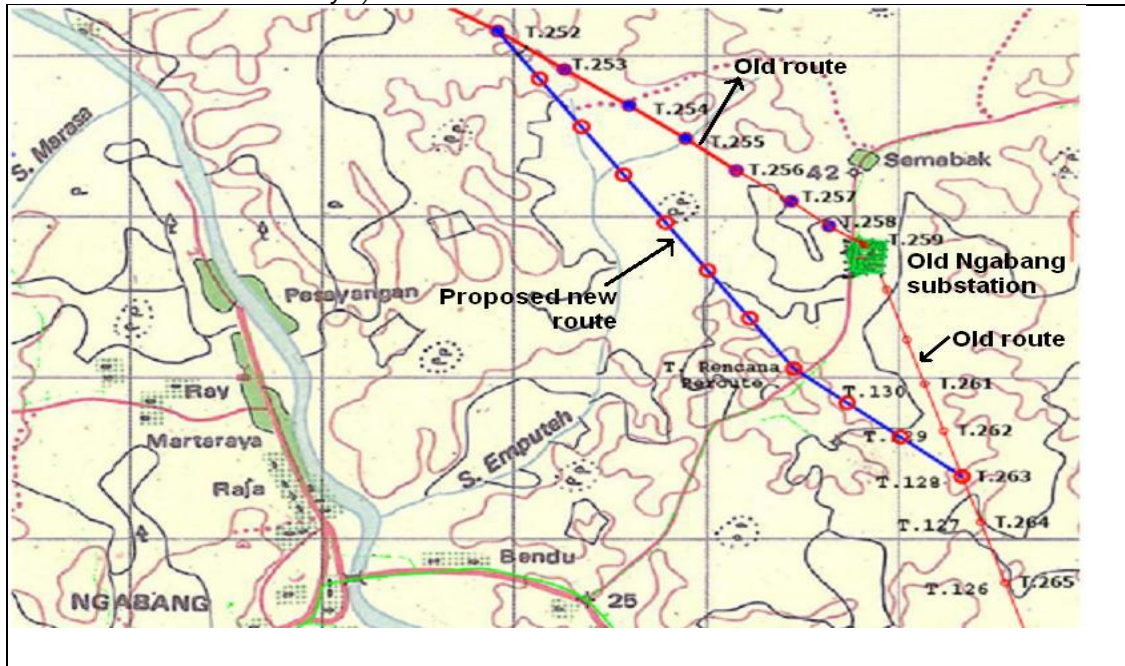
- The landuse of the new alignment is palm oil, rubber plant and bushes. There is no protected wild animal, so the impact on flora and fauna is considered insignificant.
- The new route is far from the river and other water bodies, impact on sedimentation and water quality caused by new alignment can be neglected.

b.2) Re-routes due to relocation of originally proposed Ngabang substation

Nine new towers will be developed due to the relocation of the originally planned Ngabang substation site, out of which seven towers will belong to the previous Bengkayang-Ngabang alignment and two towers belong to the previous Ngabang - Tayan alignment. The footprint of the proposed tower sites has been surveyed, the survey report from the contractor has not been received yet.

Map A-3.1 Tower re-routes of 150 kV Bengkayang-Ngabang Transmission Line at originally proposed Ngabang substation

(The new route survey has finished, but the survey report from contractor has not been received yet).



Note: The green mark (T.259) was planned for Ngabang substation, but now it is used as dwelling area, so it has been decided to relocate the substation to the South-East of Ngabang (see Map No. A-3.2)

Environmental review:

- The new alignment of the 150 kV transmission line will pass through gentle area with landuse of rubber plantation and mixed garden. The area is far from the waterbody, so erosion and sedimentation will be insignificant. There is no protected wild animal, so the impact on flora and fauna is considered insignificant.
- The originally proposed Ngabang substation area has become a dwelling area, so the location is not feasible anymore for the substation. Starting from tower No. T.252 toward tower T.259 as the end tower of 150 kV Bengkayang-Ngabang route shall be shifted by approximately 700 m southern of original route to connect with the tower of the Ngabang – Tayan Transmission Line. It will overpass the regency road and the green area along the creek in between the highly growing residential area. No significant impact is anticipated along this relocated route.

c) Tower re-routing of 150 kV Ngabang–TayanTransmission Line

The number of towers of the 150 kV Tayan – Ngabang Transmission Line is 133, counting starts from Tayan substation. The first part of the route passes along the main road from Pontianak to Ngabang, from tower 39 onwards it turns left along the village road that connects Balai Subdistrict to Jalimpo Subdistrict in Landak Regency, then at tower 95, it returns to run in parallel with the main road of Pontianak-Ngabang.

- c.1) The new proposed 150/20 kV Ngabang Substation will be developed near the tower No T.116 of the 150 kV Tayan-Ngabang Transmission Line (x=388919.962; y=39117.041). This tower is located adjacent with and on the right hand side of the

main road of Pontianak – Tayan-Ngabang in the village of Tebedak, Ngabang Subdistrict, Landak Regency.

As consequence of development of the proposed new Ngabang substation area, the route of the 150 kV Transmission Line Tayan-Ngabang starting from T.113 to T.117 shall be rerouted (see Map A-3.2).

- c.2) Due to the relocation of the 150/20 kV Ngabang substation the 150 kV Bengkayang - Ngabang Transmission Line has been shifted to southern location, the towers T.129 to T.133 of the 150 kV Tayan - Ngabang Transmission Line are also needed to be re-routed (see Map A-3.1)

Map A-3.2 Tower re-routes of 150 kV Bengkayang - Ngabang Transmission Line

(The new route survey has finished, but the survey report has not been received yet).

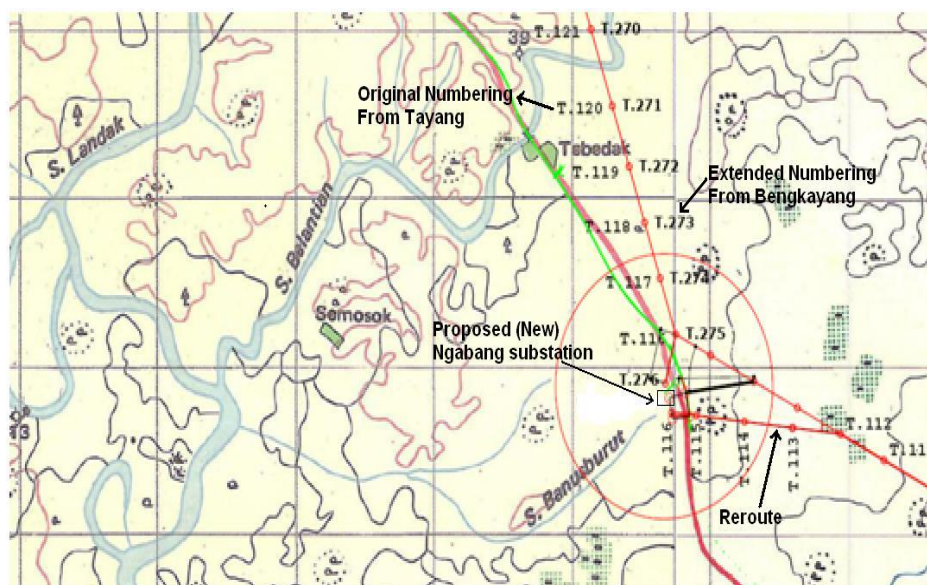


Table 1.3. TOWER CHANGES OF 150 KV TAYAN-NGABANG TRANSMISSION LINE

TOWER NUMBERS																																
SS	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60			
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90			
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120			
121	122	123	124	125	Void	127	128	129	130	131	132	133																				

Note:

- Tower Changes
- Due to landuse problem on Ngabang Substation, those towers (yellow mark) are supposed to be relocated. The new route survey has finished but the report has not been received yet.

New Ngabang substation is now closer to Tayan direction, tower 117 to 133 of Tayan- Ngabang Transmission Line have been considered to be added to Bengkayang-Ngabang Transmission Line. Accordingly, the Ngabang - Tayan Transmission Line will comprise of 113 towers.

Environmental review:

The area of the proposed substation is approximately 1 ha. The topography is undulating and the level of the area at about 1 to 4 m higher than the main road. There is no major settlement close to the area. To level the site, soil works have been carried out in March - April 2014. No quarry is needed for embankment and

no excess soil to be moved in/out from the site, so there is no major impact on traffic caused by the land preparation. Impact on water quality during the land preparation is insignificant, since the river is about 1.5 km away. The landuse of the proposed new substation is mixed vegetation that consists of bamboo, rubber trees and other wood trees. No protected fauna is found in that area.