Initial Environmental Examination

December 2015

VIE: Power Transmission Investment Program Multi-Tranche Financing Facility Tranche 3

Subproject: Second Transformer Bank for 220 kV Tra Vinh Substation

Prepared by Southern Power Viet Nam Power Project Management Board (SPPMB) for the National Power Transmission Corporation (NPT) of Viet Nam and the Asian Development Bank. This is a revised version of the draft originally posted in June 2015 available on http://www.adb.org/projects/documents/vie-ptip-t3-tra-vinh-ss-jun-2015-iee.

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November 2015

Preparation for Tranche 3 of ADB Multi-tranche Financing Facility for the Power Transmission Investment Program in Viet Nam

Second transformer bank for 220 kV Tra Vinh substation

Tra Vinh Province, Viet Nam

Prepared by
Southern Viet Nam Power Projects Management Board:
Electricity of Viet Nam

CURRENCY EQUIVALENTS

(as of 24 May 2015)

Currency Unit	–	Dong
D1.00	=	$0.00005
$1.00	=	D21,770

ABBREVIATIONS

ADB:	Asian Development Bank
AP:	Affected person
BOD:	Biochemical Oxygen Demand
COD:	Chemical Oxygen Demand
DONRE:	Department of Natural Resources and Environment
EA:	Executing Agency
ECA:	Environmental Compliance Audit
EIA:	Environment Impact Assessment
EMF:	electromagnetic field
EMP:	Environment Management Plan
EO:	Environmental Officer
EERT:	Emergency ERT
ERP:	Emergency Response Plan
ERT:	Emergency Response Team
ESU:	Environmental and Social Unit
GRM:	Grievance Redress Mechanism
IA:	Implementation Agency
IEE:	Initial Environmental Examination
LEP 2014:	Law on Environmental Protection No. 55/2014/QH13
MFF:	Multi-tranche Financing Facility
NPT:	The National Power Transmission Corporation
PCB:	Polychlorinated biphenyls
PPC:	Provincial Peoples Committee
PTC4:	Power Transmission Company No. 4
REA:	Rapid Environment Assessment
SPPMB:	Southern Viet Nam Power Project Management Board
SPS:	Safeguards Policy Statement (2009)
TSS:	Total Suspended Solids
UXO:	Unexploded Ordnance

WEIGHTS AND MEASURES

km:	kilometre
kg:	kilogram
kV:	kilovolt
ha:	hectare
mm:	millimetre

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EXECUTIVE SUMMARY

1. The National Power Transmission Corporation (NPT) of Viet Nam has requested that a second transformer bank for 220 kV Tra Vinh substation be included in Tranche III of the Multi-tranche Financing Facility (MFF) for the Power Transmission Investment Program for Viet Nam. The goal of the program is to develop and improve the quality and reliability of power supply throughout Viet Nam. The second transformer bank for 220 kV Tra Vinh substation is one of nine individual subprojects that comprise Tranche III. The subproject will meet the immediate power needs of rapidly developing industrial development of Tra Vinh province and neighboring Vinh Long province.

2. Preliminary engineering designs, and safeguard requirements of the subproject have been completed including the approval of the Environment Impact Assessment (EIA) to meet the regulations of the Tra Vinh Provincial Department of Natural Resources and Environment (DONRE). The EIA was conducted by PECC3 team. The Initial Environmental Examination (IEE) presented herein was prepared pursuant to the Asian Development Bank (ADB) Safeguards Policy Statement (2009) (SPS)[1]. The IEEs of the other eight subprojects of Tranche III were prepared separately.

Subproject Summary

3. The major components of the subproject are summarized below.

- Installation of the second transformer into the new 23.7 ha 220 kV Tra Vinh substation, Luong Hoa Commune, Chau Thanh District, Tra Vinh province.
- Supporting fire extinguishers and emergency oil trap equipment

Potential Impacts and Mitigations

4. The IEE of the second transformer bank for 220 kV Tra Vinh substation indicates the impacts of the new transformer are restricted to the construction-installation phase of the transformer. The construction-related disturbances such as noise, dust, erosion, solid and liquid waste, reduced access, potential increased vehicle traffic and traffic accidents, increased risk of worker and public injury can be managed with standard construction practices and management guidelines (e.g., IFC / World Bank Environmental, Health and Safety Guidelines (2007) for electric power transmission and distribution projects).

5. Because the subproject will be constructed inside the existing Tra Vinh substation the subproject will not require resettlement or land acquisition. There are no perceived negative induced, or cumulative environmental impacts of the subproject. There are no rare or endangered wildlife species, critical habitat, or protected areas in the subproject site which is located in Tra Vinh. The substation is not near a national protected area.

6. The existing 220 kV Tra Vinh substation in which the new transformer required an Environmental Compliance Audit (ECA) pursuant to requirements of the ADB SPS to ensure

[1]ADB, 2009. Safeguard Policy Statement, ADB Policy Paper.

there are not environmental issues or risks associated with the operation of the substation. The ECA indicated that the operation of the substation is fully compliant with the laws and regulations of Viet Nam that govern environmental management of electric power substations.

7. The brief Environmental Management Plan (EMP) prepared for the subproject prescribes impacts mitigations and environmental monitoring to minimize and manage the potential impacts of the subproject. The EMP also prescribes an Emergency Response Plan (ERP) for the construction sites and identifies the need for capacity development and training of the implementation agency / Environmental and Social Unit (IA/ESU) in environmental management and assessment as focused on the implementation of the EMP.

Conclusions

8. The IEE concludes that the feasibility design of the second transformer bank for 220 kV Tra Vinh substation combined with available information on affected environment is sufficient to identify the scope of potential environmental impacts of the subproject. Providing that significant changes to the subproject descriptions do not occur at the detailed design phase, and new sensitive environmental or cultural resources are not determined, further detailed EIA of the subproject is not required.

I. INTRODUCTION

9. The IEE presented herein was prepared pursuant to the requirements of the ADB SPS. The IEEs of the other eight subprojects of Tranche III were prepared separately.

10. The Tra Vinh subproject was assigned Environmental Category B pursuant to the ADB SPS and recent good practice sourcebook guidance[2]. A category B project will have potential adverse impacts that are less adverse than the impacts of category A project, are site-specific, largely reversible, and can be mitigated with an EMP[3]. The results of the rapid environmental assessment (REA) of the subproject are at Appendix A.

11. The IEE was prepared for the Tra Vinh subproject in the feasibility design stage using available data and information on sensitive ecological and cultural receptors that exist for the subproject site. The EIA required by the Viet Nam Law on Environmental Protection No. 55/2014/QH13 (23 Jun 2015) (LEP 2014) and Decree No. 18/2015/ND-CP (14 Feb 2015) has been completed and approved by the Tra Vinh Provincial DONRE (Appendix C).

12. The detailed designs for the extension of the Tra Vinh subproject will follow subproject approval. The EMP that has been prepared for the subproject (see section IX) will need to be reviewed to ensure it meets the final detailed designs of the subproject.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

13. The second transformer bank for 220 kV Tra Vinh substation will be implemented according to the directives set down for use of Official Development Assistance by Government Decree No. 131/2006/ND-CP (9 Nov 2006), and in accordance with the provisions for the parent sector project.

A. Viet Nam Regulatory Framework for Environmental Assessment

14. The recently revised Viet Nam LEP 2014 prescribes the requirements for environmental assessment for international and domestic project interventions that affect natural and social environment. Following the LEP 2014, the supporting Government Decree No. 29/2011/ND-CP on strategic environmental assessment, and EIA was replaced by Decree No. 18. Supporting Circular No. 27/2015/TT-BTNMT (29 May 2015) detail guideline for Decree No. 18.

15. The screening criteria of Decree No. 18 distinguish projects that require a full EIA from comparatively simpler projects that require an IEE. The difference between the Government EIA and IEE reflects the required level of assessment, and final review and appraisal that is required. The screening criteria for power transmission projects in Decree No. 18 are based on voltage. All projects undertaken with voltages exceeding 110 kV require EIAs.

16. Thus, a Government EIA is required to satisfy the Government regulatory framework. The EIA was prepared and approved in accordance with Viet Nam Law and approved by the Tra Vinh Provincial Peoples Committee (PPC) on 31 December 2014. The Government Environmental Compliance Certificate for the subproject is at Appendix C.

[2]ADB, 2012, Environmental Safeguards, A Good Practice Sourcebook, Draft.
[3]Footnote 6, pg 19.

B. Power Transmission Sector Regulatory Framework

17. Table 1 summarized key laws and policies governing the power sector in Viet Nam that apply to the subproject. Specific legal directives and required approvals for the subproject are summarized in Table 2.

Table 1. Power Network Legislation and Associated Legal Instruments

Laws and Regulations	Description
A. Law	
Law No. 24/2012/QH13 (20 Nov 2012)	Amends and supplements a number of articles of the Electricity Law No. 28/2004/QH11 (3 Dec 2004)
Electricity Law No. 18/2004/QH11 (3 Dec 2004)	Prescribes the electricity development planning and investment; electricity saving; electricity markets; rights and obligations of organizations and individuals conducting electricity activities and using electricity; protection of electric equipment and facilities, electricity works and electric safety.
B. Decrees	
Decree No. 81/2009/NĐ-CP (17 Aug 2005)	Prescribes the safety and protection of high-voltage power grids.
Decree No. 14/2014/ND-CP (26 Feb 2014)	Stipulates in detail the implementation of electricity law regarding electricity safety, including: safety in generation, transmission, distribution and use of electricity in production; compensation and assistance of housing, works, land and plants in the safety corridor of overhead power transmission line upon the construction of high-voltage grid.
C. Circular	
Circular No 22/2010/BXD (3 Dec 2010)	Regulates labor safety in work construction, construction and installation of equipment which are newly built, repaired, renovated, relocated, embellished or restored; dismantling of works and warranty for maintenance works.
Ministry of Industry and Trade Circular No. 03/2010/TT-BCT (22 Jan 2010)	Regulates protection on high-voltage power network

C. Land Development and Construction Regulatory Framework.

18. Directives for land development and construction that are relevant to the power transmission sector are summarized in Table 2.

Table 2. Applicable land development and construction law and policy

Laws	Description
A. Law	
Land Law No 45/2013/QH13 (29 Nov 2013)	Prescribes the regime of land ownership, powers and responsibilities of the State in representing the entire-people, owner of land and uniformly managing land, the regime of land management and use, and the rights and obligations of land users.
B. Decrees	
Decree No. 44/2014/ND-CP (15 May 2014)	Regulates methods for land pricing, adjustment to land price brackets and land price lists, specific land pricing and provision of consultancy on land pricing.
Decree No. 37/2014/ND-CP (15 May 2014)	Details some articles of the Law on Land concerning compensation, support, and resettlement upon land expropriation by the State.

C. Circulars	
Circular No. 36/2014 / TT-BTNMT (30 Jun 2014)	Specifies detailed methods of valuation of land prices, construction, adjustment of land prices; specific land prices valuation and land prices valuation consulting service.
Circular No. 37/2014/TT-BTNMT (30 Jun 2014)	Provides detailed regulation on compensation, assistance, and resettlement when the State acquires land.
Document of Prime Minister No. 1665/TTg-CN (17 Oct 2006)	Regards management of clearance of site, mine and explosive ordnance for construction

D. ADB Safeguard Policy

19. The ADB SPS along with the recent good safeguard practice sourcebook clarify the rationale, scope and content of an executing agency (EA) and supported by technical guidelines (e.g., Environmental Assessment Guidelines 2003). Projects are initially screened to determine the level of assessment that is required according to the following three environmental categories (A, B, or C).

20. Category A is assigned to projects that normally cause significant or major environmental impacts that are irreversible, diverse or unprecedented such as hydroelectric dams (an EIA is required). Category B projects have potential adverse impacts that are less adverse than those of category A, are site-specific, largely reversible, and for which mitigation measures can be designed more readily than for category A projects (an IEE is required).Category C projects are likely to have minimal or no negative environmental impacts. An environmental assessment for Category C and FI projects is normally not required but environmental implications need to be reviewed.

E. Applicable Environmental Laws, Policy, Standards, and Guidelines

21. The following are additional applicable directives for environmental assessment and protection for domestic and international development in Viet Nam:

Table 3. Environmental Protection Laws and Regulations

Laws and Regulations	Description
A. Laws	
Law on Environmental Protection No. 55/2014/QH13 (23 Jun 2015) (LEP 2014)	This Law provides statutory provisions on environmental protection activities; measures and resources used for the purpose of environmental protection; rights, powers, duties and obligations of regulatory bodies, agencies, organizations, households and individuals who are tasked with environmental protection.
Biodiversity Law No. 20/2008/QH12 (13 Nov 2008)	Pursuant to the 1992 constitution of the Socialist Republic of Vietnam, which was amended and supplemented under Resolution No. 5/2001/QH10 (25 Dec 2001) of the 10th National Assembly, this law stipulates biodiversity conservation and sustainable development.
B. Decrees	
Decree No. 18/2015/ND-CP (14 Feb 2015)	Provides the requirements for Environmental Protection Plan, Strategic Environmental Assessment, EIA and Environmental Protection Scheme.
Decree No. 19/2015/ND-CP (14 Feb 2015)	Regulation detailing a number of articles of the Environmental Protection Law.
Decree No 80/2014/ND-CP (6 Aug 2014)	This Decree regulates drainage and treatment of wastewater in urban areas, industrial zones, economic zones, processing and export zones, and rural residential areas. It also prescribes the rights and obligations of organizations, individuals and households having activities related to

Laws and Regulations	Description
	drainage and treatment of wastewater within Vietnam's territory.
Decree No. 179/2013/ND-CP (14 Nov 2013)	Prescribes the sanction on administrative violations on the domain of environmental protection.
Decree No. 59/2007/NĐ-CP (9 Apr 2007)	Prescribes the regulations on solid waste management
C. Circulars	
Circular No. 27/2015/TT-BTNMT (29 May 2015)	Guidance for Strategic Environmental Assessment, EIA, and Environmental Protection Plan.
Circular No. 01/2012/TT-BTNMT (16 Mar 2012)	Regulation on setting-up, assessment, approval, inspection and certification of the implementation of detailed environmental protection project; setting up and registration of simple environmental protection projects.
Circular No. 22/2014/TT-BTNMT (5 May 2014)	Provides the guidelines for the implementation of the Government's Decree No. 35/2014/ND-CP (29 Apr 2014), amending and supplementing a number of articles of the Government's decree No. 29/2011/ND-CP (18 Apr 2011), providing strategic environmental assessment, EIA and environmental protection commitment.
Circular No 12/2011/TT-BTNMT (14 Apr 2011)	Regulation on the management of Hazardous Waste. Under this law, generators of hazardous waste are required to register with MONRE/DONRE and to have separate hazardous waste storage area. The treatment and disposal of hazardous waste will be contracted through a registered hazardous waste management company.
Circular No. 39/2010/TT-BTNMT (16 Dec 2010)	National technical regulation on noise (QCVN 26/2010/BTNMT) and on vibration (QCVN 27/2010/BTNMT)
Circular No 25/2009/TT-BTNMT (16 Nov 2009)	National technical regulation on hazardous waste threshold (QCVN 07:2009/BTNMT).
Circular No 32/2013/TT-BTNMT (25 Oct 2013)	National technical regulation on ambient air quality (QCVN 05/2013/BTNMT)
D. Decisions	
Decision No. 16/2008/QD-BTNMT (31 Dec 2008)	National technical regulation on surface water quality (QCVN 08.2008/BTNMT); Underground water quality (QCVN 09/2008/BTNMT) and Domestic wastewater (QCVN 14/2008/BTNMT)

a. Environmental Standards and Regulations

Water quality:

- QCVN 01:2008/BYT – National technical regulations on quality of drinking water
- QCVN 08:2008/BTNMT – National technical regulations on quality of surface water
- QCVN 09:2008/BTNMT – National technical regulations on quality of groundwater
- QCVN 10:2008/BTNMT– National technical regulations on quality of coastal water
- QCVN 14:2008/BTNMT– National technical regulations on quality of domestic wastewater
- QCVN 24:2008/BTNMT– Industrial wastewater discharge standards
- QCVN 02:2009/BYT – National standard of domestic water supply
- TCVN 5502:2003 – Supplied water – Requirements for quality
- TCVN 6773:2000 – Water quality – Water quality for irrigation purposes
- TCVN 6774:2000 – Water quality – Water quality for aquaculture protection
- TCVN 7222:2002 – Water quality for concentrated domestic WWTP
- TCVN / QCVN – Standard methods for analyzing environmental quality

Air Quality:

- QCVN 05:2013 – Standards for ambient air quality
- QCVN 06:2008 – Maximum allowable concentration of hazardous substances in the ambient air
- TCVN 6438:2001 – Maximum permitted emission limits of exhausted gases from vehicles

Solid Waste Management:

- QCVN 07:2009 – National technical regulations for classification of hazardous wastes
- QCVN 25:2009 – National technical regulations for wastewater of solid waste sites
- QCVN 03:2008/BTNMT – National regulation for heavy metal concentrations in soil

Vibration and Noise:

- QCVN 26:2010/BTNMT – national technical standard for noise
- TCVN 6962:2001 – Allowable vibration level for public and residential areas
- TCVN 6962:2001 – Allowable vibration and shock from construction activities

International Guidelines

- IFC/World Bank Group, 2007. EHS Guidelines for Electric Power Transmission & Distribution
- AWWA Standard Methods for the Examination of Water and Wastewater

b. International Environmental Management Conventions

22. Viet Nam is signatory to the following relevant international conventions:

- Stockholm Convention on Persistent Organic Pollutants (2002)[4]
- Convention Concerning the Protection of the World Cultural and Natural Heritage (1972)
- Vienna Convention for the Protection of the Ozone Layer (1985)
- Montreal Protocol on Substances that Deplete the Ozone Layer (1987)
- Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen (1992)
- United Nations Framework Convention on Climate Change (1992)
- Convention on Biological Diversity (1992)

III. SUBPROJECT DESCRIPTION

23. The 220 kV Tra Vinh substation with a new transformer will improve its existing capacity to meet peak load demand, and socio-economic development of Tra Vinh province, specifically Chau Thanh district and area. The project also provide power supply to enhance the provincial power supply stability, provide safe operation of the electric line network provided, and supply the surcharge for domestic use in Tra Vinh. Part of the neighboring Vinh Long Province will also beneficial to this project.

24. The main work of this project is the installation of the second transformer and associated equipment in the same premise of the existing Tra Vinh substation. A set of additional supporting equipment, i.e. fire extinguishers and emergency oil trap, for the safe operation of the entire substation will also be set into place.

25. The substation infrastructure is located in an area of 23,700 m^2 in Luong Hoa Commune, Chau Thanh District, Tra Vinh Province in the southern part of Viet Nam. It is bounded by rice fields to the north, east, west and the National Highway 60 to the south (Figure 1). The substation with a single transformer started operation in 2012. Well wall-fenced, the substation is constructed with sufficient infrastructure for long-term and safe operation, which comprises of its main electrical component, operational asphalted paveways, water supply and drainage system, lighting system, dedicated storage for hazardous waste an operation house and firefighting equipment.

[4] link http://www.pops.int/documents/implementation/nips/submissions/nip_vietnam.pdf

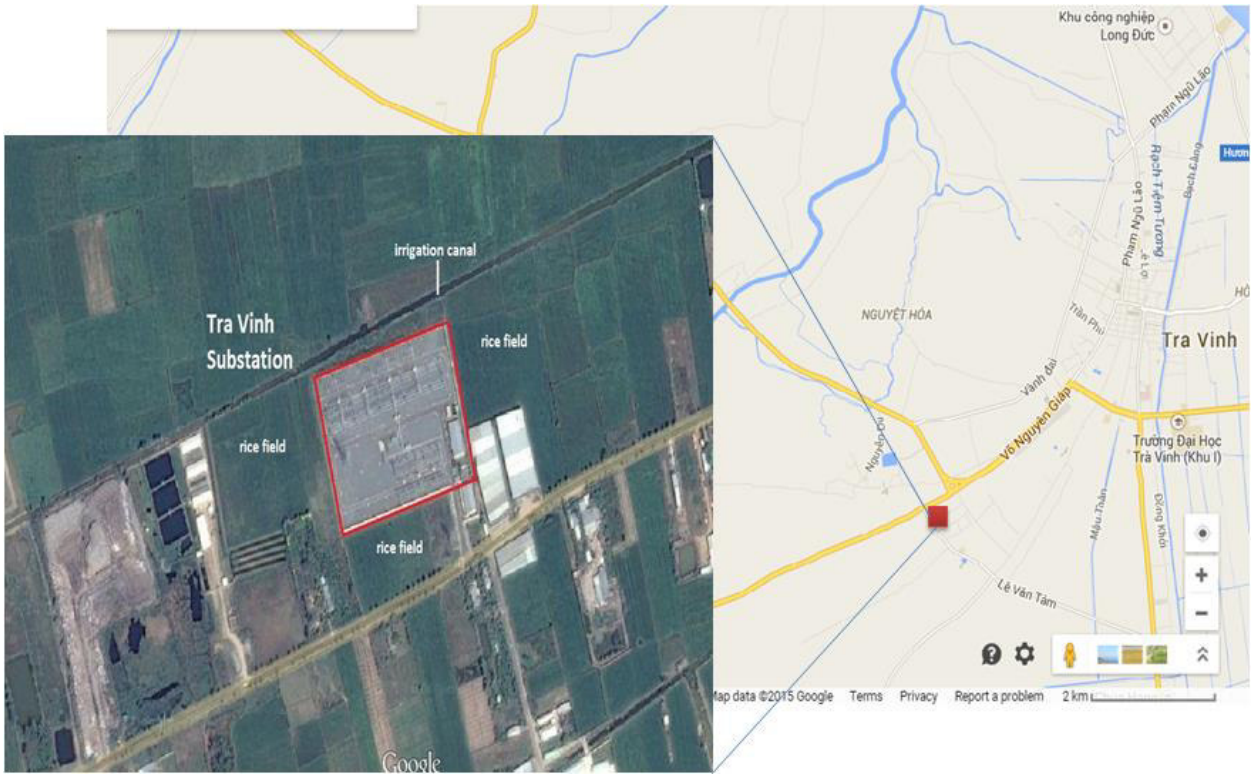

Figure 1. Location of 220 kV Tra Vinh substation

A. Regular Operation of existing Tra Vinh Substation

26. Starting its operation in December 27, 2012, the 2.37 ha substation transmits 220 kV from Vinh Long 220 kV substation and Duyen Hai Thermal Power Center to distribute power to several 110 kV substations in the region including: Tra Vinh, Duyen Hai, Cau Ke and Long Duc. The substation has a total of 12 staff and workers (excluding 5 guards) who operate and maintain the substation. They are all engineers and receive training from Power Transmission Company No. 4 (PTC4) for 6-9 months and must pass three examinations before starting operation works. The staff are assigned three 8-hour shifts daily. They are not eligible to conduct major repair works which are done by an authorized maintenance team of Western Power Transmission Company No. 2 (affiliating to PTC4).

27. An Operational Manual (O&M) and Work Conduct Policy for the substation were introduced for the substation. They include operation and maintenance procedures, emergency responses and usage of toolkits. The substation monitors safety implementation by recording two indicators: 1) temperature on a daily basis and 2) checking radiation and electromagnetic field (EMF) safety once a year. Regarding waste management, the Tra Vinh Substation has a specified storage for temporary hazardous wastes with clear signage and protective equipment provided. The operation of the substation creates 1.7m^3 of wastewater per day. The wastewater is then treated by biological technology in septic tank before discharging into nearby irrigation canal. PPEs are provided to protect workers. Work time is divided into shifts which do not excess 8 hours each and workers will be examined for EMF exposure once a year.

B. Oil tank and Emergency Procedure

28. Oil used for the transformers is of non- Polychlorinated biphenyls (PCB) type as strictly required by Electricity of Vietnam (EVN). A 120 m^3 emergency oil tank has been installed for the 1st transformer to prevent oil leaks and spillages. Its capacity suffices to contain all oil volume in the current transformer and the 2nd transformer to be constructed. Oil is checked once a year to verify oil quality, oil losses, and supplement if needed. A separate emergency procedure for oil accidents was introduced to all staff of the Substation. They include:

- Report directly to Head/Deputy Head of the substation.
- Isolate area of oil leaks and spillages.
- Notify PTC4 to proceed with replacing and repairing equipment and troubleshooting leaks and spillages.
- Collect the oil if the oil spill from the tank, prevent oil from affecting the aquatic environment and the community
- Notify specialized unit to collect, transport and process the trapped oil in the oil tank.

C. Construction Plan for the new transformer in Tra Vinh Substation

29. The construction of the 2nd transformer will be carried out during 6 months. It requires a total of 20 workers among whom 16 are well trained technicians. The workers will install 1 work-camp outside of the substation or rent a nearby house if appropriate. Electricity and water supply needed for the construction are provided by the existing sources in the substation on contractual basis. A storage house in an area of 80m^2 for equipment and material will be temporarily built inside the substation and decommissioned immediately after completion.

30. The main construction activities include: 1) earthwork and concrete work for the 2nd transformer ground; and 2) erection work of steel frame. Most of constructing materials and equipment (except for the imported transformer) are procured locally. A list of machines to be used in the construction phase is provided below (Table 4).

Table 4. Construction machines for the 2nd transformer in Tra Vinh Substation

Machine	Quantity	Usage
Water pump 10m3/h	1	For construction
10 ton Crane	2	For erection of frame and machines
90 ton Crane	2	For erection of the 2nd transformer
Machines for installing and testing water pipeline	1	For firefighting and pumping
250 liter concrete mixer	1	For concrete mixing
80 liter mortar mixer	1	For mixing mortar and grout
Table vibrators	2	For concretizing

31. The specifications of the 2nd transformer are as follows:

- Capacity ratio: 125/125/40MVA
- Group of winding: YNa0d11
- High voltage winding: potential level 225+8x1,25%kV with rated capacity of 125MVA
- Medium voltage winding: potential level 115kV with rated capacity of 125MVA
- Low voltage winding: potential level 23kV with rated capacity of 10MVA

32. The 2nd transformer utilizes the diagram similar to the existing transformer which is summarized as below and in Figure 2

- 220kV side: the same system diagram with additional feeder for the 2nd transformer

- 110kV side: the same system diagram, with additional feeder for the 2nd transformer, 01 feeder bay to Long Duc and 01 feeder bay to CauKe installed in the 1st phase will be activated
- 22 kV side: the same system diagram with, with additional outdoor feeder to switch from the power supply of local 22kV grid to the supply from the second transformer.

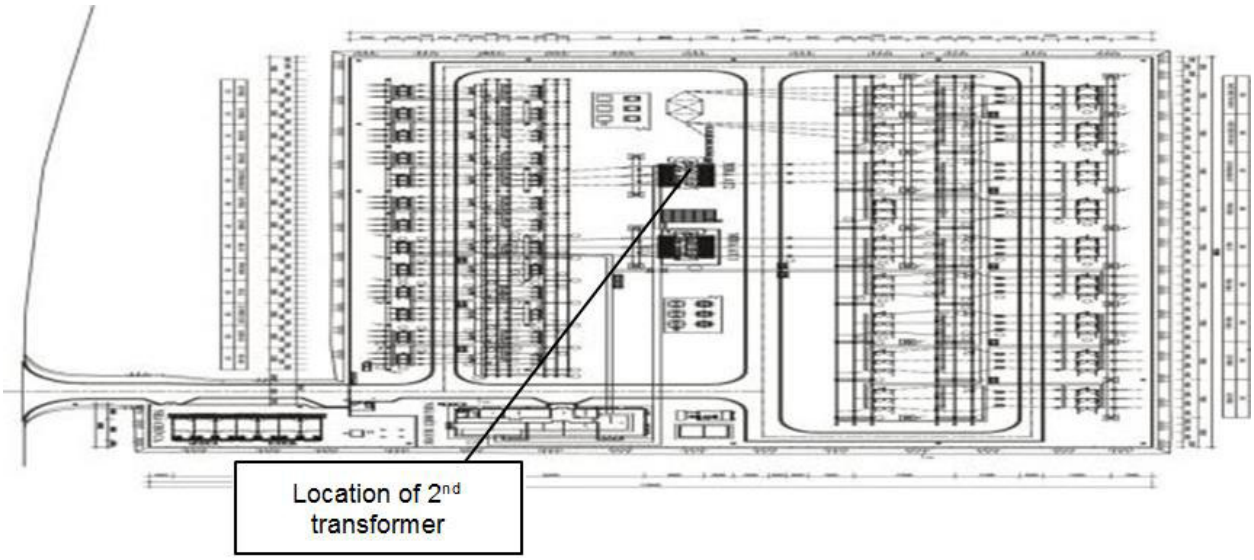

Figure 2. Plan view Tra Vinh 220 kV substation

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Climate

33. The subproject area is situated in the Southern Climate Zone which is typified by a tropical monsoon climate characterized by high temperatures with very little seasonal variation. Annual average temperature is about 28°C. There are two seasons a year: a) dry season from December to April; and b) rainy season from May to November. Tra Vinh climate is influenced by 2 monsoons from the southwest and northeast.

a. Temperature

34. Air temperature is high and changes little in year-round for recent years. Annual average temperature for the period 2011 – 2013 is 26.9 – 27.1°C. The mean difference between the hottest month and the coldest month in 2013 is about 3°C. The cool months of year are from December to January (Table 5).

Table 5. Temperature regime at Cang Long Station in Tra Vinh Province (°C)

Station	Year	Mean Value by Month												Year Avg
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cang Long	2011	25.6	25.7	27.4	27.9	27.6	27.1	27.2	27.2	26.9	27.3	27.1	26.0	26.9
	2012	26.0	26.7	28.0	27.7	27.6	27.8	27.1	27.6	26.1	27.2	27.5	27.2	27.2
	2013	25.6	26.7	27.7	28.4	28.5	27.7	27.0	27.3	26.8	27.0	27.2	25.4	27.1

Source: Tra Vinh Statistical Yearbook 2013

35. According to the report of the Working Group on Climate Change and Development (2007) in the Mekong region, average temperatures over the last century have risen by 0.3 to 0.8 °C. Further temperature increases are expected along with more extreme weather events such as floods and droughts, changes in the amount and distribution of rainfall, disruption of seasonal monsoons, and rising sea levels.

b. Sunlight

36. Average total sunlight in Tra Vinh is approximately 2,600 hours per year. Sunlight during the dry season is greater than during the rainy season (Table 6). There are remarkable fluctuations in sunshine duration from year to year and between months without a clear pattern.

Table 6. Average number of sunlight hours (hrs)

Station	Year	Mean Value by Month												Year Avg
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cang Long	2011	189.9	225.8	204.0	244.2	175.8	158.8	179.1	200.6	142.9	217.5	188.7	176.4	192.0
	2012	206.8	237.1	246.7	242.9	198.3	189.2	196.5	227.3	115.5	184.9	214.6	238.8	208.2
	2013	203.7	231.5	284.9	191.9	204.6	142.0	160.5	183.5	132.5	174.1	199.7	149.6	188.2

Source: Tra Vinh Statistical Yearbook 2013

c. Humidity and Rainfall

37. The Tra Vinh area is humid. Annual average humidity is about 83% - 85%. Table 7 shows the significant difference between dry season and rainy season rainfall. Total annual average rainfall in the region is around 1,500 mm. Drought events are found common in Tra Vinh due to the fact that rainfall is not rich and very seasonal.

Table 7. Monthly mean humidity in Cang Long Station (%)

Station	Year	Mean Value by Month												Year Avg
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cang Long	2011	81	77	77	79	85	85	84	87	86	86	85	83	83
	2012	82	79	81	85	87	86	87	85	90	86	86	82	85
	2013	80	78	78	84	87	88	87	87	88	87	85	83	84

Source: Tra Vinh Statistical Yearbook 2013

Table 8. Monthly rainfall in Cang Long Station (mm)

Station	Year	Mean Value by Month												Year Avg
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cang Long	2011	1.1	-	3.2	13.8	297.6	341.7	174.6	324.3	189.5	243.0	301.6	6.8	172.5
	2012	0.8	8.8	73.2	33.3	261.6	141.4	292.3	62.4	391.6	379.1	37.5	18.4	141.7
	2013	74.1	3.5	0.3	90.0	106.0	216.2	172.9	174.3	259.5	147.6	165.7	28.4	119.9

Source: Tra Vinh Statistical Yearbook 2013

38. The yearly evaporation ranges from 48 mm in July to 111 mm in March. The highest evaporation during the dry season is from December to April, especially in areas of high sand dunes and coastal areas.

d. Wind velocity.

39. Along the 65 km coastline of Tra Vinh the average wind speed approaches 3-4 m/s typically, with gusts up to level 6 m/s. The dominant wind directions include northeast and east -

northeast. In the monsoon northeast wind speed is about 1-5 m/s. In days of rains, tropical depressions or storms wind speed may reach 10m/s. In the inner area, however, a mild wind velocity is observed throughout the year (Table 9).

Table 9. Wind velocity and Number of thunderstorm-days in Cang Long station

Parameters	Months, year												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (Avg.)
Wind velocity (m/s)	2.0	2.4	2.2	1.6	1.3	1.7	1.8	2.1	1.5	1.3	1.5	1.7	1.8
Number of thunderstorm-days (day)	0.2	0.1	1.4	6.0	15.1	11.5	12.3	11.9	14.5	13.1	4.5	1.2	91.7

(Source: National technical regulation on natural condition data in construction _QCVN 02:2009/BXD)

2. Air quality

40. Ambient air quality in Tra Vinh is good according to the Tra Vinh Development Master Plan 2011-2015 (Table 10). Air pollutants are concentrated in urban areas with the increasing use of motorbikes and other personal motorized vehicles and in local inner waterways.

41. The EIA team analyzed air quality at the Tra Vinh substation site. The results shows that the air quality (SO_2, NOx, CO, dust) of the area is satisfactory as required by QCVN 05:2008/BTNMT. Noise level is also within GoV standard, compared to QCVN26:2010/BTNMT.

Table 10. Air pollutants at Tra Vinh substation

no	Sampling location	Noise (dBA)	Dust (mg/m^3)	SO2 (mg/m^3)	NO2 (mg/m^3)	CO (mg/m^3)
1	K1	52,7	0,175	0,056	0,044	2,87
2	K2	40	0,132	0,046	0,032	2,41
3	K3	61,7	0,264	0,083	0,068	4,76
QCVN26:2010/BTNMT		**70**	-	-	-	-
QCVN05:2013/BTNMT		-	**0,3**	**0,35**	**0,2**	**30**
Note on location:						
K1:	At the existing 125 MVA transformer, coordinates X=1.096.498;Y=643.144					
K2:	In front of the operation house, coordinates X = 1.096.470, Y = 643.182					
K3:	At substation gate coordinates X = 1.096.418, Y = 643.035					

Source: EIA report for the substation prepared by Center of Environment and Energy, 2014

3. Topography, Geology and Soils

42. Topographical features of Tra Vinh Province are typical of coastal plains, influenced by the interference between rivers and the sea. The region is formed by the low-lying, flat terrain mixed with sand dunes. The common elevation level of the province varies from 0.1 - 1m which accounts for 66% of the total natural area. Generally the terrain is favorable for agricultural production of gravity irrigation and not prone to flooding. According to PECC3, soil in the subproject area is divided into 4 layers (Table 11).

Table 11. Geographic features surveyed at Tra Vinh substation site.

Layer	Depth(m)	Volumetric mass γ (T/m^3)	Adhesive force (T/m^2)	Angle of internal friction φ (degree)	Density Δ
Filling material	0.2-1.5	1.800	0.20	20.00	2.60

Very soft, grey sandy clay	5.0	1.587	0.80	4.42	2.65
Very soft, yellowish grey sandy clay	6.0	1.612	1.20	3.32	2.65
Very soft, grey sandy clay	6.0-15	1.601	0.70	9.87	2.65

43. The survey conducted by PECC3 determined the substation is located in an area with seismic level of 6 MSK, repeating cycle $T_l \leq 200$ years, the probability of seismic event $P \geq 0.1$ over a period of 20 years. To the bottom of stratigraphic borehole (15m) there are 4 layers: filling material layer, SM, CL and CH. The load capacity of the area is very weak and therefore appropriate measures were taken for enforcement of the foundation, including the specific site where the 2nd transformer is going to be installed.

44. Six major groups of soil are discovered in the province of Tra Vinh, including (Figure 3):

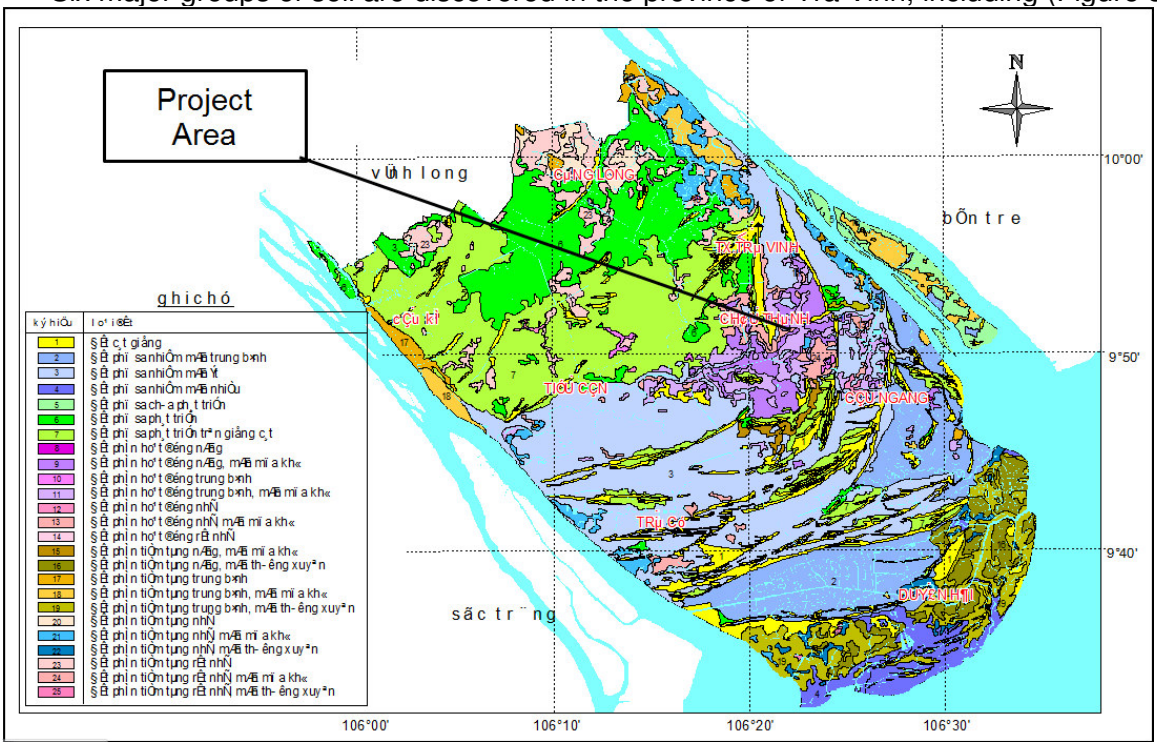

Figure 3. Soil types in Tra Vinh province

Sand dunes: occupying 7.55% of the natural area, not very fertile but suitable for vegetables and diverse land use.

Saline soil: occupying about 25.17% of the total natural area, of which about 24.5% is of high salinity, used for aquaculture and mangrove forestry. The remaining area is used for rice cultivation;

Alkaline soil: accounting for 17.63% of the total, currently used for forestry and aquaculture purposes; A majority of the area is slightly alkaline (deep alkaline layer) which can be used for agricultural purposes, but with limited diversification of crops.

Alluvial soil: accounting for 19.45% of the total area of the province, distributed along Tien River and Hau River, abundantly watered, very suitable for numerous crops and land use purposes.

Anthropogenic soil: occupying approximately 19.64% of the total natural area, including residential land and special land use; the remaining area is used for perennial crops, mainly fruits and coconut.

Coastal accretion: occupying approximately 2.27% of the natural area, resulted from the process of sedimentation in the estuary.

4. Surface water / groundwater resources

45. The hydrology of Tra Vinh Province is complex as it is surrounded by Hau Giang River, Co Chien River and the sea. The two rivers, with total length of 578km, are the main source of freshwater for the area which is then distributed through a large system of canals.

46. Tra Vinh is not affected by upstream flooding from Mekong River as in some provinces in Mekong Delta but there has been localized flooding in lowland sub-regions that last for 3-5 months a year. Flooding occurs due to intense rainfall in a short period of time (3 -5 days) plus the rising river water (water from upstream and the high tide).The substation site is located amid rice fields and small canals and not prone to localized flooding.

47. Five underground aquifers are found in Tra Vinh Province and Chau Thanh Province siting the project area. Upper groundwater (middle and upper Pleistocene) aquifers are salinized (salt water intrusion from canals), while the water in the middle 3 layers (Pliocene) is more abundant and of better quality. In general, shallow groundwater at depths below 100 m beneath the sand dunes is supplied mainly from accumulated rainwater. Groundwater at depths deeper than 100 m is pretty rich. A recent increase of crop farming and aquaculture activities led to severe shortage of groundwater in Tra Vinh.

5. Water quality

48. Data on surface water in Tra Vinh is rather poor compared to other localities in the region. Water quality is monitored at 10 urban and rural stations in the province (Table 12). Overall, the quality of supply water is acceptable except for biological parameters according to a monitoring survey in 2005. As stated by the 2010 Tra Vinh Land use Master Plan, the local water pollution is caused by domestic wastewater, wastewater from aquaculture farming and processing facilities, overuse of fertilizers and pesticides, and industrial wastewater. The most polluting source for surface water in Tra Vinh is domestic wastewater with Coliform parameter that is 2 times over the limits set by QCVN 14:2008/BTNMT.

Table 12. Surface water quality at 10 stations in Tra Vinh, March 2005

Parameter	Unit	Sampling location									
		I	II	III	IV	V	VI	VII	VIII	IX	X
PH	-	7.9	6.8	7.2	7.0	7.0	7.9	7.2	6.5	7.9	8.0
COD	mg/l	30	24	40	22	20	20	18	22	15	25
BOD_5	mg/l	11	8	8	7	6	7	8	7	5	8
SS	mg/l	165	62	31	13	7	86	205	62	70	163
$N\text{-}NO_3$	mg/l	0.5	0.21	0.44	0.69	0.29	0.49	0.69	0.49	0.22	0.38
$N\text{-}NH_4$	mg/l	0.03	0.02	0.4	0.22	0.13	0.03	0.03	0.05	0.05	0.06
∑Coli	1000 MPN/100	240	400	3.9	12	46	46	46	46	46	240
Pb	mg/l	0.03	0.01	0.02	0.05	0.02	0.04	0.01	0.01	0.03	0.07
∑Nitrogen	mg/l	1.3	0.8	1.0	1.7	0.9	1.1	1.5	4.0	1.3	0.9

I: Long Binh Bridge,Tra VinhCity;II:BenGia, Long Huu,Tra VinhCity;III:La Bang, Don Chau, Tra Cu Dist.;IV:Tap Son, Tra Cu Dist.;V:Tam Phuong, Chau ThanhDist.;VI:Tieu Can Bridge,Tieu Can Dist.;VII:My Hue Bridge, Cang Long Dist.; VIII:CauNgangMarket;IX: LocRiver,Chau ThanhDist.;X:CauKe Market.

Source: Tra Vinh Center for Rural Water and Sanitation, 2010.

49. A survey of wastewater from the Tra Vinh substation was conducted in October 2014 (Table 13) Wastewater at the discharge gate to the irrigation canal in front of the substation was sampled. The analysis showed that the sampled parameters in domestic wastewater treated in the substation's septic tanks are within the limits allowed by column B - National technical regulations for domestic wastewater QCVN 14:2008/ BTNMT.

Table 13. Surface wastewater quality at Tra Vinh, 2014

Parameter	Unit	Result	QCVN14:2008/BTNMT, Colum B
pH	-	6.28	**5– 9**
total suspended solid(TSS)	mg/l	45	**100**
COD	mg/l	15	**-**
BOD_5	mg/l	29	**50**
Nitrate	mg/l	3.74	**50**
Phosphate	mg/l	0.38	**10**
Coliform	MPN/ml	2.700	**5.000**

Source: Tra Vinh EIA report, October 2014

6. Groundwater quality

50. Currently there are no official databases to assess groundwater quality in Tra Vinh. Limited information on groundwater quality is gathered from individual studies which are not up-to-date, for example, those from Tra Vinh Provincial Center for Rural Environment and Sanitation and Can Tho University. The studies proved that for the period from 2005-2009, insignificant changes in groundwater quality are seen and almost all parameters samples are within the Viet Nam standard on groundwater, except for Coliform contamination.

Table 14. Groundwater quality in rural and urban areas of Tra Vinh Province

Parameter	Unit	Sampling locations						
		I	II	III	IV	V	VI	VII
PH	-	8.1	8.1	8.1	7.5	8.3	7.4	7.3
COD	mg/l	5	7	5	6	5	9	6
BOD_5	mg/l	2	3	2	3	2	4	3
Rigidness	$MgCaCO_3$/l	192	237	256	295	200	302	230
N-NO_3	mg/l	0.4	0.82	1.3	1.2	2.9	1.4	0.84
N-NH_4	mg/l	0.9	1.08	1.6	5.13	2.18	8.12	2.84
∑Coli	MPN/100ml	460	43	64	2400	23	1100	4
Al	mg/l	0.09	0.08	0.05	0.08	0.62	1.01	0.92
∑ Fe	mg/l	0.16	0.693	0.795	0.85	2.43	0.062	0.473

I: *Well in Tap Son Commune, Tra Cu Dist.;****II:*** *Well in Tieu Can Market;****III:****Well in HieuTuCommune,Tieu Can Dist.;****IV:****Well in PhongThanhCommune,CauKeDist.;****V:****Well in CauKeMarket;****VI:*** *Well in Phuong ThanhCommune,Cang Long Dist.;****VII:****Tap water in Tra Vinh DONRE.*

Source**:** Tra Vinh Provincial Center for Rural Environment and Sanitation and Can Tho University, 2005, 2009.

51. According to the Tra Vinh DONRE, the province has about 85,000 drilled wells and over 4,700 dug wells. Of which more than 1,600 wells are damaged and create risks of salinization

and pollution of groundwater. The top aquifer has been salinized and unsuitable for drinking purpose.

B. Biological Environment

1. Vegetation and Land Use

52. In Chau Thanh District of Tra Vinh province, the natural forest area in the district is 42.66 ha, concentrated in Long Hoa Commune 37.33 ha and 5.33 ha in Hung My Commune. The coastal protection forest area is 135.7 ha that represents mangrove forests of *Sonneratiapagatpat, Avicenniagerminans* and mangrove palms. The terrestrial fauna and aquatic species are very few both in number and variety. Forest regeneration is fostered in the alluvial areas in estuaries for environment protection and erosion control (Table 15).

53. The farming area accounts for 77.4% of the total land area in Chau Thanh District, non-farm land and unused land are 22.5% and 0.1% respectively. In Luong Hoa Commune where the substation is sited, the vegetation is characterized by agricultural crops, mostly rice fields and garden fruits such as pomelo, mango etc. There is no forest in the commune.

Table 15. Land use in Chau Thanh District in 2012

Administrative unit	Total (ha)	2012 (ha)		
		Farm land	Non-farm land	Unused land
Total	**34.338,71**	**26.591,52**	**7.710,95**	**36,24**
Chau Thanh Town	348,77	242,69	106,08	-
Da Loc Commune	3.651,30	3.236,48	413,61	1,21
My Chanh Commune	2.666,54	2.380,9	276,29	9,35
Thanh My Commune	2.144,32	1.937,13	207,16	0,03
Luong Hoa Commune	**2.295,89**	**2.066,4**	**219,38**	**10,11**
Luong Hoa A Commune	2.314,82	2.036,03	276,40	2,39
Song Loc Commune	3.453,32	3.120,82	332,43	0,26
NguyetHoa Commune	1.180,76	997,78	181,61	1,37
HoaThuan Commune	1.397,06	1.078,31	315,36	3,39
Hoa Loi Commune	1.559,31	1.397,56	197,24	4,51
Phuoc Hao Commune	2.326,63	2.040,56	285,94	0,13
Hung My Commune	2.793,72	1.723,05	1.070,12	0,55
Hoa Minh Commune	3.622,41	2.049,03	1.570,90	2,48
Long Hoa Commune	4.543,67	2.284,78	2.258,43	0,46

Source: 2012 Chau Thanh District Statistical Yearbook.

2. Wildlife

54. Tra Vinh is known for its coastal mangrove habitat; the most famous is Duyen Hai mangrove forest reserve. In an area of 650 ha, it is home to 64 species of plants belonging to 57 genera, 31 families and animals according to Tra Vinh Province's Environmental Masterplan 2011 with vision to 2020 and Chau Thanh District Statistical Yearbook 2013. The Tra Vinh substation is 65 km from the reserve and therefore immune from any impact from the substation. The substation is located in entirely converted agricultural land with no natural or critical habitat[5] in the area. There are also no rare or extinct animals reported in the subproject

[5] Natural habitat is land and water areas where the biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions.

area as determined from local biodiversity data and discussion with provincial DONRE. Moreover, the new transformer will be placed inside the existing substation – inside the large walls of the substation on to a level graveled site, and therefore will not come in contact with the modified environment outside the substation.

3. Conservation Areas

55. There are no conservation areas within the proximity of the substation.

C. Socio-economic condition

1. Population

56. Chau Thanh district is relatively populous in the province. According to 2012 statistics, the population of Chau Thanh district is 137,403 people with a density of 400 people /km^2 (provincial density: 425 people/km^2).

57. The population is distributed unevenly, often concentrated in the town, and along the main roads. The highest population is concentrated in the town of Chau Thanh with 1,784 persons/km^2 with the lowest density of 199 people/km^2 in Long Hoa commune. Among the communes, Luong Hoa has the average population and density (Table 16).

58. 65% of Chau Thanh District population are Kinh people, approximately 34% are Khmer and other ethnic minority groups account for 1%.

Table 16. Population distribution in subproject area

Commune and town	Natural area (km^2)	Avg. population (person)	Population density (person/km^2)
Total	**343,39**	**137.403**	**400**
Chau Thanh Town	3,49	13.359	1.784
Da Loc Commune	36,50	10.801	366
My Chanh Commune	26,67	7.654	405
Thanh My Commune	21,44	10.400	357
Luong Hoa Commune	**22,96**	**9.236**	**453**
Luong Hoa A Commune	23,15	12.223	399
Song Loc Commune	34,53	6.353	354
NguyetHoa Commune	11,81	11.692	538
HoaThuan Commune	13,97	9.705	837
Hoa Loi Commune	15,99	10.262	607
Phuoc Hao Commune	23,27	8.493	441
Hung My Commune	27,94	11.336	304
Hoa Minh Commune	36,22	9.042	313
Long Hoa Commune	45,44	6.226	199

Source: Chau Thanh District Statistical Yearbook 2012.

Critical Habitat is a subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or that are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic, or cultural importance to local communities.See ADB.2009. *SPS*. Manila (Grossary)

2. Local Economy

59. Chau Thanh district is typical of agricultural economy. Most people live on farming; the poverty rate in the district is still high, concentrated mainly in communes with such as Da Loc, Hoa Loi, Luong Hoa A, Long Hoa and Phuoc Hao. The district poverty incidence has decreasing over the last 5 years at the average rate of 2.1% per year.

60. The farming sector in Luong Hoa Commune accounts for 31% of the communal economy and is quite diverse. This sector is based on 3,742.7 ha for both annual and perennial crops that include rice, vegetables, mushroom, coconut, fruits, cocoa etc. In 2014 the number of livestock raised in the Commune was 506,484, of which 6,864 were pigs, 3,670 cows, 7 buffalos and 495,943 chickens or ducks. The aquaculture sub-sector grows by 16% compared to 2013 with estimated yield of 4,495 tons of shrimp, snake-head mullets, and catfish.

61. Luong Hoa's industry consists of small industry and handicraft. Presently, there are 59 units for industry-handicraft production of plastic weaved buckets and textile. The output of industry-handicraft production reached 90 billion VND in 2014.

62. Commerce and services are growing but at very small scale. There are 181 units and households performing commercial businesses who employ more than 400 laborers. The revenue from commerce and service activities is estimated at 61.34 billion VND, growing by 21.6% year-to-year.

3. Social Infrastructure

a. Public Health and Sanitation.

63. Currently, there are 12 district health centers and polyclinics in Tra Vinh. Clinics exist at each commune/town.

64. According to data from the Center for HIV/AIDS in Tra Vinh province, in 2013, the province has detected 1,825 cases of HIV infection (1,042 infected, 714 dead); Tra Vinh city has the highest number of HIV infections with 346 cases (18.9%), Cang Long with 221 cases (12.1%), Tra Cu with 217 cases (11.9%), Chau Thanh with 212 cases (11.6%), Duyen Hai district with 86 cases (4.7%); and 37 cases of unknown address (2.0%). Accordingly, 104 of 105 communes, wards and towns in the province have detected HIV cases.

65. The Luong Hoa Commune Clinic was completed in 2014 to provide basic and primary healthcare to the local people in the subproject site. Universal vaccination applies to 100% of under 5 year old children. More severe patients will be easily transferred to district and city hospitals within 1-2 hrs with the improved system of roads.

66. 85% of communal households have sanitary toilets and 90% have access to clean water (2,856 households). Domestic waste is disposed of at home, normally using landfill holes, as there is no concentrated waste treatment facility in Luong Hoa Commune. Waste generated in offices and markets are collected and handled at the Commune's landfill by a collective environmental unit.

b. Education

67. The education system in Chau Thanh district covers from kindergarten level to high school. All communes and town achieved universal secondary and high school education.

Currently, the district has 54 schools at all levels, 830 classes with 23,297 students. The schooling rate to kindergarten at age of 5 years reaches 99.1%; that of 6 years old children to elementary school reaches 99.8%.

c. Communications:

68. The subproject area is being covered by many telephone networks such as Vietel and VNPT telecoms, and some other telecom companies. Therefore, it is highly convenient for people to communicate and develop this sector.

d. Water and electricity:

69. The subproject area does not have tap-water system, main water source supplying people's life is underground water at drilled wells and dug wells. Along with 500 kV transmission lines and the 220 kV substation, there are several power development projects for communes with difficulties in the area, e.g. Central Highland phase 2 etc. As of 2014, 95% of commune households have access to electricity. However, due to unstable power supply, power outage is frequent in dry season lowering the ability to serve for production and business.

4. Infrastructure for transportation

70. Infrastructure development for transportation is being constantly improved which has increased the standard of living and access to services. The road network is reasonably well developed throughout the subproject area. A network of provincial, district, commune and village roads also serve the area. Tra Vinh is traversed by 3 main highways No. 53, 54 and 60 with approximate length of 250 km, connecting to Ho Chi Minh City and the Mekong Delta; 5 provincial roads of approximately 180 km long. Traffic in the subproject area in Chau Thanh District is convenient with many important roads such as National Highway No. 54 to Tra Vinh City. Most of roads in the subproject area are concreted which is convenient to traffic movement of cars, buses, and tipper trucks. The inland waterway system is also convenient for heavy transportation and agricultural cargos.

5. Cultural and Heritage Sites

71. In Tra Vinh, there are 17 cultural and historical sites that are recognized at national and provincial level. The nationally recognized sites include Ho Chi Minh temple, Ba Om Pond tourist spot, Ang Pagoda, Phuoc Minh Cung Pagoda, Gia Linh Tu Pagoda, Luu Cu 2 archeological site, Con Tau wharf, ApSoc Pagoda, Bo Luy-Ao Nam and Bodhisalaraja-Kom Pong Pagoda. The provincial level sites consist of Phuoc My Tu relics, revolutionary Bao Mon Pagoda, Long Thanh Pagoda, Ta Rom Pagoda, An My village house, Ba Tram village house, Tra Khup Pagoda. Many of those sites are related to Khmer cultural and religious traditions.

72. The IEE with PECC3 investigated all possible sensitive receptors in a range of 5 km from the Tra Vinh substation. It is found that no such sites are within 500 m of the substation, therefore no impacts from the subproject are incurred. Table 17 presents all environmental sensitive receptors around the concerned site.

Table 17. Environmental Sensitive Receptors around the Substation

Substation	Name of receptors	Distance from the substation
220kV Tra Vinh substation	Ba Om Pond	1.5 km
	Bo Luy-Ao Nam	1 km
	Lo Gach Pagoda	2 km
	Communal People's Committee Office	3 km

Substation	Name of receptors	Distance from the substation
	Primary school	2.5 km
	Secondary school	2.5 km
	Communal clinic	3 km
	Tuberculosis hospital	600m

Source: IEE consultant and PECC3 team, 2015

6. Unexploded Ordnance (UXO) Clearance

73. After decades of war, UXO remains a significant issue in Vietnam. However, the risk of UXO accidents is zero since clearing of UXO has been conducted before the construction of the substation since 2008. The ground within the boundary of the substation for instalment of the 2nd transformer has been prepared; therefore additional UXO clearance is not necessary.

7. Subproject affected person (AP)

74. No local residents will be affected by the installation of the 2nd transformer and related construction activities in the substation. Only rice fields are immediately outside the established footprint and walls of the substation (Figure 1). There are about 10 households living around the substation in a nearest distance of 300 m.

8. Additional features of 220 kV Tra Vinh Substation

75. The photos of the sites of substation and new transformer are shown below.

Fig 4a:
Gate of substation

Fig 4b: Existing Transformer

Fig 4c: Location for new transformer

Fig 4d: Rice fields adjacent to substation

Fig 4e: Wastewater discharge to irrigation canal

Figure 4. Views of 220 kV Tra Vinh substation site

V. INFORMATION DISCLOSURE AND PUBLIC CONSULTATION

A. Information disclosure

76. Formal disclosure to APs and stakeholders of information on the 220 kV Tra Vinh substation that occurred in a formal meeting setting during the IEE is meant to form the beginning of continued information disclosure and stakeholder involvement as the subproject is implemented. Information on the subproject was provided to stakeholders in their local language. As part of the stakeholder communication strategy regular information exchange meetings with stakeholders are strongly encouraged throughout implementation of the subproject.

77. The IEE will be easily available to the stakeholders contacted during examination in written and verbal forms in local language of Vietnamese. At least the executive summary of the IEE will be translated to local language and distributed to all APs. The IEE will be available on NPT and SPMB websites, and at the subproject site. Similarly, all subproject reporting with specific reference to stakeholder consultation minutes, environmental monitoring, and reports on EMP implementation released by the EA/IA will be available at the same offices and websites. The IEE will be disclosed on the ADB website as well as environmental monitoring reports that will be prepared by the EA/IA after construction starts.

B. Public Consultation

78. Stakeholder consultations were developed to meet the requirements of meaningful consultation as stipulated by the ADB SPS. The strategy embodied the principles of meaningful engagement, transparency, participation, and inclusiveness to ensure that affected and marginalized groups such as women, and the poor, were given equal opportunities to participate in the design of the subproject.

1. Identification of Stakeholders

79. Stakeholders were identified and engaged in a participatory manner. Stakeholder communication focused on institutional stakeholders, affected communities, and persons

directly affected by proposed subproject interventions. The stakeholders of the subproject include:

- Mass organizations such as Women's Union, and Farmers Union which provided information for the design of the various subproject interventions, and which might participate in implementation of measures and interventions;
- Affected households and businesses living along the transmission line and near the substation site who may be directly and/or adversely affected, and who have an interest in the identification and implementation of measures to avoid or minimize negative impacts; and
- Other institutions or individuals with a vested interest in the outcomes and/or impacts of the subproject including (i) PPC, (ii) DPC; (iii) Project EA, (iv) PECC3, and (v) commune leaders.

2. Public consultation meeting

80. A writing consultation with local People's Committee and Commission was previously held by PECC3 team in October 2014. A follow up direct community consultation meeting was held by the IEE consultant, who represents the IA/EA, to discuss the location and impact of the substation for both environmental and social aspects. The meeting is convened in Luong Hoa Commune, Chau Thanh District of Tra Vinh Province on 20 Mar 2015. The public meeting consisted of the following two component procedures.

1. The engineering consultant introduced the subproject including the substation location, design and communes and wards; and
2. The environmental consultant presented ADB's environmental safeguards policy, safety regulations in the Vietnam power sector, anticipated environmental impacts and respective mitigation measures (to be developed in IEE), the grievance redress mechanism (GRM) for environmental and resettlement problems.

81. The participants of the public consultation meeting included Commune leaders, representatives of mass organization such as Women Union and APs. A total of 15 people were consulted (Appendix B). During the meeting, people raised their questions and comments on the environmental issues. The PECC3 consultant and IEE national consultant answered and explained for all questions to the participants. While some locals directed their concerns to the proposed component of the subproject, a larger number of the concerns were related to the adverse impacts from operation of the existing substation.

3. Results of Public consultations

82. The comments/questions from communal authorities were collected by PECC3 consultation. The main comments of communal authorities are as follows:

- Agreement with the environmental impacts of the project addressed in the locality.
- Agreement with the solutions and measures to mitigate environmental impacts of the project.
- The project owner will ensure all mitigation measures during the construction phase are implemented.
- The operator of the substation will strictly follow regulations during the upgrading and operation of the substation

83. The summary of comments/questions from local authorities/people and answers of consultants, as representatives of EA/IA, are summarized in Table 18. Subsequent formal consultations are not required by an IEE. However, required input from stakeholders and response from project owners will occur through the GRM. The concerns and issues of the subproject expressed by the meeting participants are addressed by the EMP.

Table 18. Summary of concerns and issues with subproject

Location and time	Comments/questions local people	Response of IA	Response of Project[6]
Luong Hoa Commune, Chau Thanh District, Tra Vinh Province 20 March 2015	Construction activities must comply with the schedule in order to avoid negative influence on living conditions and farming activities of local people.	A detailed EMP is prepared to ensure that the Contractor of the subproject will avoid and prevent any potential impacts on the local environment and social life.	The EMP prescribes preparation and distribution of complete construction schedule to affected community in order to minimize disturbance.
	Wastewater discharged from the existing substation floods surrounding rice fields and damages the productivity.	Though the raised matter is not directly related to proposed component of the project, it is highly appropriate for further investigation for the future operation of the substation. If these concerns are found, the local people are encouraged to file their complaint to the local authority.[7]	While existing wastewater management is out of the subproject scope, the EMP prescribes the requirement for wastewater management as part of operation of the new transformer.
	Concerns about the effects of EMF on the health of the people. Furthermore, the psychological effects are also apparent when the lands around the substation cannot be tradable.	Technical analysis confirms that there is no such effect on people health especially because the substation site is completely fenced and far away from residential areas. Dealing with psychological effects is beyond the Project Owner and Operator's responsibility and capability.	In addition to the IEE the EMP also provides the results of recent extension review of EMF of the WHO which indicates health effects of EMF are inconclusive.
	Lighting from the substation impeded the normal growth of rice crops	See the above response to the wastewater. The Project Owner will clarify with the operator to have adequate corrective actions.[8]	While out of the subproject scope, the EMP specifies the requirement to direct boundary lighting of substation inward and down towards the ground.
Conclusion	Luong Hoa Commune People's Committee (CPC) and local people agree with the installation of the 2nd transformer in 220 kV Tra Vinh substation. Impacts from the current operation of the substation on local people will be handled in due time. Project Owner and the Contractor will implement the EMP to minimize potential adverse impacts of the proposed subproject.		

[6] Issues and concerns are addressed by EMP.
[7] A field visit to the substation site was made immediately by the IEE consultant and the locals following the consultation meeting. A blockage of the drainage ditch from the substation to the adjacent irrigation canal was identified. The IEE consultant recommended the Operator to clear the blockage as soon as possible.
[8] The operator has recently adjusted the lighting direction inwards so that nearby rice fields will no longer be harmed.

VI. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

84. The assessment of potential impacts of the subproject is structured by the three development phases of the subproject defined by: *pre-construction*, *construction*, and *post-construction operational phase.* The structure is carried forward to the EMP for the subproject (section IX).

A. Subproject Benefits

85. The single comprehensive benefit of the subproject is the provision of needed additional electrical power to Tra Vinh district and throughout Tra Vinh province while reducing power outages or brownouts.

B. Pre-construction Phase

86. There are no negative impacts during pre-construction. No resettlement or land acquisition will be required because transformer will be installed inside substation.

87. The subproject EMP will need to be reviewed to ensure that the EMP fully addresses the final schedule activities for the installation of the new transformer. The key impact management measures to be implemented during the pre-construction phase are:

- Completion of detailed activities of the transformer installation including scheduling equipment delivery along the access road; and
- Updating and initiation of the brief subproject EMP.

C. Construction Phase

88. The primary subproject activities consist of the transportation of the pre-assembled transformer and associated equipment along the existing access road to the substation followed by the installation of the transformer on the cleared site inside the substation property. Thus, the potential environmental impacts of the new transformer centre on: 1) use of the access road for transformer equipment delivery, risk of increased traffic accidents, and dust and noise production; and 2) potential worker accidents during transformer installation; and 3) potential spills of hazardous substances and waste. There is no risk of soil erosion or pollution from construction wastes because the transformer will be installed on a level site inside a large fenced substation area. Rice fields and land use are outside substation walls. Disruption to substation while transformer is installed will be minimal, and planned, and implemented according to standard procedures.

89. Construction management measures to mitigate the common potential impacts associated with the installation of the transformer are itemized below. The mitigation measures are detailed in the subproject EMP.

- Regular use of wetting agents will be employed at substation site, and along the busy access road.
- All equipment delivery and construction vehicles, and gas powered equipment will be maintained in proper working order to minimize emissions, and not operated at night if possible to minimize noise.
- Speed limits will be posted and adhered to by construction vehicles.

- Local workers will be used as much as possible to prevent or minimize influx of migrant workers, and incidence of social disease and community unrest.
- Dedicated fuel storage areas must be established away from public areas and marked clearly.
- To minimize the risk of public and worker injury, Ministry of Labour Invalids and Social Assistance (MOLISA) regulations on Occupational, Safety, and Community Health must be applied[7], along with the IFC/World Bank Environment, Health, and Safety Guidelines (2007) for Power Distribution that govern the safe and orderly operation of civil works will be followed.
- Aggregates (e.g., sand, gravel, rock) that are transported by truck will be covered.
- Prolonged use of temporary storage piles of file will be avoided, or covered, or wetted regularly to prevent dust and erosion.
- Storage of bulk fuel will be on covered concrete pads away from the public and worker camp. Fuel storage areas and tanks must be clearly marked, protected and lighted. Contractors will be required to have an emergency plan to handle fuel and oil spillage.

D. Operation Phase

90. The potential impacts of the operational transformer are restricted to worker safety, and possible spills of hazardous waste (e.g., transformer oils). These potential impacts are mitigated by application of existing occupation and worker safety directives and guidelines of Ministry/Department of Labour Invalids and Social Assistance (M/DOLISA), and operation regulations for substations and current regulations for operating substations and environmental protection as introduced above (Table 1 and Table 2). The the IFC/World Bank Environment, Health, and Safety Guidelines (2007) for Power Distribution will also be followed during operation of new transformer.

E. Climate Change

91. There have been numerous recent reports and summaries of climate change scenarios for Viet Nam[9,10,11] based on the most recent climate change projections of the different Global Circulation Models (GCM). The fact sheet for Viet Nam[12] compiled by the MONRE of Viet Nam summarizes projected climate change for Viet Nam as follows.

92. By 2100, average annual air temperature in the country is expected to increase by 2.3 C^o with the frequency of heat waves increasing by 100-180%, and cold surges decreasing by 20-40%. Total rainfall and extreme rainfall events are expected to increase everywhere in the country with particular increases occurring in the mountainous northern areas. However, rainfall is expected to decrease during dry season. By 2100, mean sea level is expected to increase 1.0 m.

1. Climate Risk and Vulnerability[13]

93. The sensitivity of the 220 kV Tra Vinh substation subproject to climate change is considered low as determined by the initial REA of the subproject (Appendix A). The substation

[9] ADB (2013). Viet Nam and Climate Change Assessment and Impacts, 31 pgs + Appendices
[10] MONRE, 2009. Climate Change and Sea Level Rise Scenarios, 15 pgs + Appendices
[11] UNEP, 2010. Assessment of Capacity Gaps and Needs of Southeast Asian Countries Addressing Impacts, Vulnerabilities, and Adaption to Climate Variability and Climate Change, 215 pgs + references
[12] MONRE 2010, Climate Change Fact Sheet for Viet Nam
[13] ADB (2014) Climate Proofing ADB Investment in the Transport Sector: Initial Experience, 88 pgs + Appendices

site is well drained which will not expose it to increased flooding from increased frequency and severity of rainfall events. Integral to the transformer installation is elevation of the substation which makes the facility resilient to potential increases in the flooding of the adjacent canal that connects to the Mekong delta.

2. Contribution to Global Climate Change

94. Consideration of climate change includes measures to reduce the contribution of the subprojects to greenhouse gas production. Effort through design will be taken to reduce the carbon footprint of the project by ensuring, for example, that speed limits along upgraded roads are established and subsequently enforced, vehicles that use the access road are maintained in good working order, and all lighting installed at the subproject component sites use light bulbs that are energy efficient.

VII. ANALYSIS OF ALTERNATIVES

95. The main work of this project is the installation of the second transformer and associated equipment in the same premise of the existing Tra Vinh substation. No alternative subproject designs or locations were available for the IEE.

VIII. PUBLIC GRIEVANCE REDRESS MECHANISM (GRM)

A. Type of Grievances

96. Any AP can submit a grievance to Southern Viet Nam Power Project Management Board (SPPMB) or PTC4 if they believe a practice is having a detrimental impact on the community, the environment, or on their quality of life. The affected public was introduced to and apprised of the GRM during initial public consultations. Grievances may include:

- Negative impacts on a person or a community (e.g. health and safety issues, nuisances, etc.).
- Dangers to health and safety or the environment.
- Social impacts due to construction activities or impacts on social infrastructure.
- Failure to comply with standards or legal obligations.
- Improper conduct or unethical behavior of Contractor leading to nuisance of AP(s).

B. Grievance Redress Mechanism (GRM)

97. A subproject grievance can be defined as an actual or perceived subproject-related problem that gives ground for complaint by an AP. As a general policy, SPPMB (during construction) and PTC4 (during operation) will work proactively toward preventing grievances through the implementation of impact mitigation measures and community liaison activities that anticipate and address potential issues before they become grievances. Nonetheless, during construction and operation it is possible that unanticipated impacts may occur if the mitigation measures are not properly implemented, or unforeseen issues occur. In order to address complaints, a project GRM will be developed in accordance with ADB requirements and Government procedures.

98. The GRM will be established to provide an effective and transparent channel for lodging complaints and for addressing grievances. The GRM will be established prior to the construction of the subproject and will be maintained during operation and maintenance.

99. For complaints received about the construction works, SPPMB will involve the Contractor. When these are not resolved, any complaint is then facilitated by SPPMB through the ESU under the Compensation Department. For complaints about substation operation, the PTC4 will act on the complaint. These will be entry points to whom the AP could directly register their complaints. Contact details for the entry point of complaints will be publicly disseminated on information boards at the substation. Mechanisms to contact the point of entry will be through face-to-face meetings, written complaint, telephone conversations, or email.

100. The following are the steps for the GRM (Figure 5):

Step 1: For complaints occurring during the construction phase, APs can register the complaint directly to the Contractor and the head of the commune by means of contact information prescribed in the information boards at the substation site. Upon receipt of the complaint, the Contactor is required to record/document all complaints and to coordinate with the complainant immediately and to provide mitigation actions to the complaint within two weeks. The Contractor is required to report complaints received, resolved, and unresolved to SPPMB through the monthly progress report.

Step 2: If the complainant is not satisfied with the action(s) undertaken by the Contractor, the AP can inform the head of the commune about the matter, which will document the complaint in the complaints register. The commune head/authority through the Commune People's Committee will then call a meeting of the complainant, SPPMB-Compensation Department and the Contractor to resolve the complaint. After discussion of the possible solutions, SPPMB monitors the resolution of the complaint. The Contractor shall be required to report any action to SPPMB in the monthly project progress reports.

Step 3: If the complainant is not satisfied with the action(s) undertaken at the level of Commune People's Committee, the AP may elevate the case to the district level for resolution.

Step 4: Complaints not resolved at the district level is elevated to the People's Committee at the provincial level for resolution.

Step 5: When the complaint is not resolved at the People's Committee at the provincial level, the complaint is then elevated to the People's Court. The decision of the People's Court becomes the final legal basis for the decision on the complaint.

C. Legal Guarantees for Complaints and Grievances

101. Under the regulations in Viet Nam, APs having complaints or grievances will not be responsible for paying any administrative and legal fees in filing their complaints. Any site clearing is not allowed while the resolution of the complaint is still pending.

102. In cases where the AP is illiterate, the AP can ask assistance from one representative of his household who can then write all the complaints and grievances to be submitted to the district level for resolution.

103. Under the law, all meetings to resolve complaints and grievances will be documented and the minutes of meetings will be disclosed and posted at the Commune People's Committee.

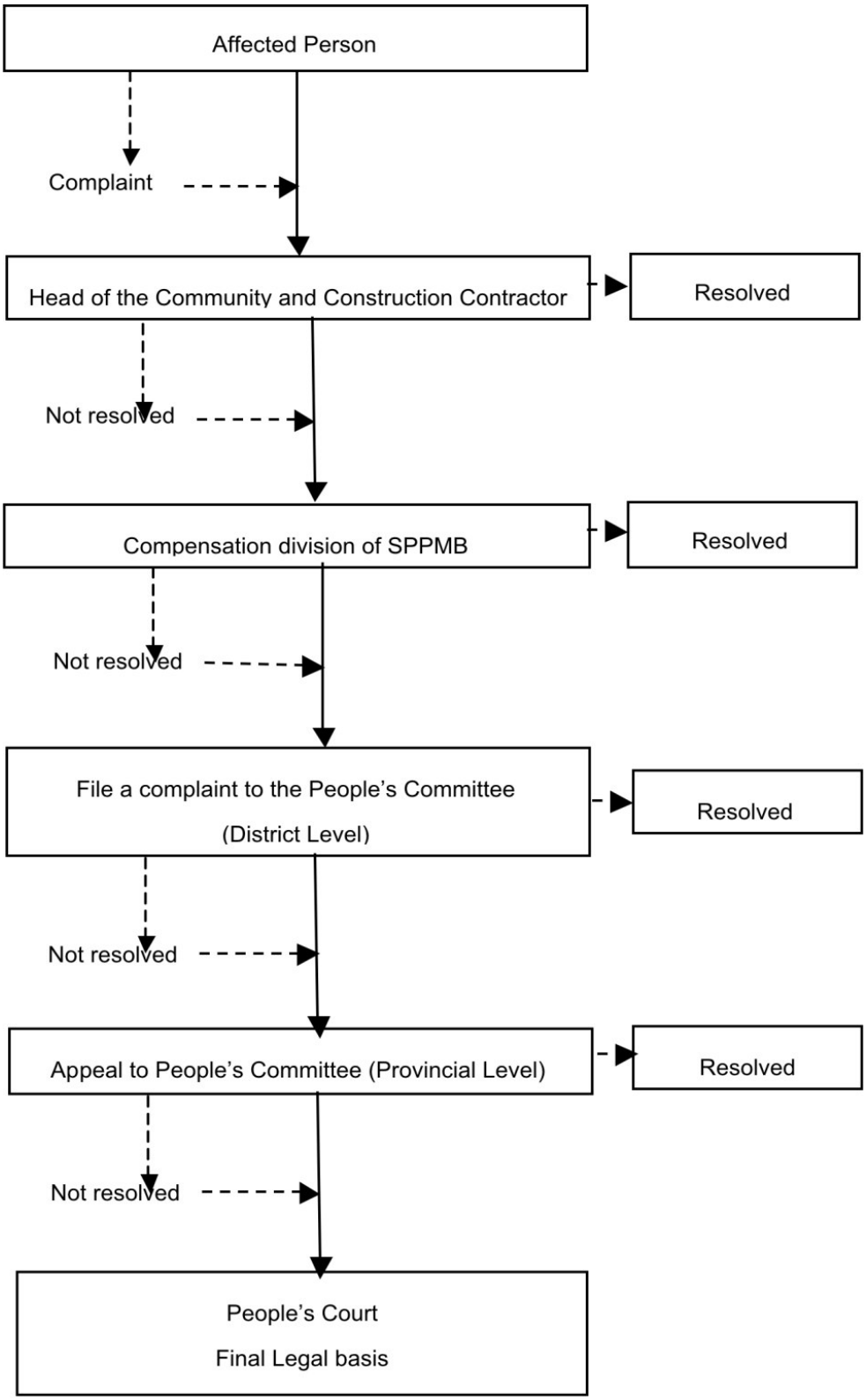

Figure 5. The Grievance Redress Mechanism (GRM)

IX. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

104. A brief EMP has been prepared for subproject. The EMP integrates the results of the IEE into a formal plan for the implementing agency and Contractor to prevent or minimize potential environmental impacts. The EMP addresses the results of the public consultations on the subproject that were convened as part of the IEE. The EMP, *inter alia*, consists of an Impacts Mitigation Plan, a Monitoring Plan, and an ERP, and the institutional responsibilities for the EMP.

A. Institutional Arrangements and Responsibilities

105. At the feasibility stage the primary management framework responsible for the implementation of the EMP for the new transformer at the 220 kV Tra Vinh substation is summarized as follows. NPT is the EA. The EA takes overall responsibility for implementing the EMP with executive support from SPPMB which is the implementing agency (IA) of the subproject. The IA under the direction of the EA implements the subproject and EMP with an assigned ESU whose sole responsibility is to implement the EMP.

106. The ESU oversees and assists the work of the environmental officer (EO) of the construction Contractor who implements the EMP with the CEMP[14]. The day-to-day installation operations including monitoring of waste management and worker safety during the installation of the transformer will be the responsibility of the PTC4. The PTC4 will operate the substation and new transformer. A summary of indicative responsibilities for implementation of the EMP is provided below.

107. The responsibilities of the EA with support from EVN include:

1. Overall responsibility for implementation of EMP including providing sufficient budget for the EMP;
2. Provide coordination and supervision for the limited environmental monitoring for IA/ESU;
3. Liaise with ADB on the implementation of the EMP; and
4. Coordinate resolution with IA/ESU with issues arising from the implementation of EMP.

108. The responsibilities of the IA/ESU include:

5. Notify DONRE to verify Government approvals of subproject are met;
6. Articulation of CEMP requirements in Contractor bid documents which included appended EMP;
7. Conduct bid evaluations, specifically completeness of CEMP;
8. Undertake day to day management of EMP implementation activities;
9. Ensure compliance with any environmental or social loan covenants and assurances with respect of entire subproject
10. Lead required follow-up meetings with all affected stakeholders in public consultations;
11. Prepare and submit quarterly reports on EMP implementation to IA/EA;
12. Oversee implementation of CEMP by contractor;

[14] Contractor EMP prepared by contractor from EMP which is part of bid documents.

13. Undertake regular construction site inspections to ensure Contractor implements CEMP properly; and
14. Ensure EO of contractor submits monthly reports on construction mitigations and monitoring.

109. The responsibilities of EO of Contractor include:

15. Implement CEMP for construction phase of subproject; and
16. Prepare and submit monthly reports on mitigation and monitoring activities of CEMP and any environmental issues at construction sites.

110. The DONRE is the provincial agency which oversees environmental management of Tra Vinh province. The DONRE with District staff provides direction and support for environmental protection-related matters including application of the LEP 2014, EIA, and environmental standards.

111. The ADB provides guidance to EA/IA with any issues related to EMP.

B. Summary of Potential Impacts of Subproject

112. The potential impacts of the subproject are summarized in Table 19.

Table 19. Summary of potential impacts of subproject

Pre-construction Phase
• None
Construction Phase
• Dust, noise, and reduced and/or blocked public access along access road caused by increased truck traffic, disruption of local traffic, increased risk of traffic accidents, damage to existing roads, and worker injury, and possible contaminant spills on site
Operational Phase
• Risk of worker accidents associated with new transformer • Potential spills of hazardous materials such as transformer oil

C. Impact Mitigation Plan

113. The brief impact mitigation measures of the EMP are presented for the three phases of subproject implementation (pre-construction, construction, operation) in Table 20.

Table 20. Impact Mitigation Plan

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[15] (USD)	Responsibility	
							Supervision	Implementation
Pre-construction Phase								
Finalize activities and scheduling for installation of transformer	No negative environmental impacts	1. Implement efficient and safe transformer installation procedure.	Inside substation, along access road	Before subproject implemented	Once	No marginal cost[16]	IA/ESU	IA/PTC4
Disclosure, and engagement of community	No negative impacts	2. Inform community of transformer installation schedule including increased traffic periods along access road 3. Initiate GRM	For all installation activities.	Beginning of subproject	Quarterly	No marginal cost	IA/ESU	IA/PTC4
Complete bid documents	No negative environmental impact	4. Ensure EMP appended to contractor tender documents which instruct contractors to use EMP to construct their CEMPs, and that CEMPs must be budgeted.	Substation	Before construction	As required	No marginal cost	IA/DONRE	IA/PTC4
Confirm approved construction waste disposal sites	No negative impact	5. Notify DONRE to confirm disposal areas for construction waste.	Substation	Before construction	As required	No marginal cost	IA/DONRE	IA/PTC4
Capacity development	No negative environmental impact	6. Develop and schedule training plan for IA/ESU/EO to be able to fully implement CEMP, and to manage implementation of mitigation measures by contractors.	Substation	Before construction	As required	No marginal cost	IA/DONRE	ESU

[15] Costs will need to be updated during detailed design phase.
[16] No marginal cost indicates that costs to implement mitigation are to be built into cost estimates of bids of contractors.

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[15] (USD)	Responsibility	
							Supervision	Implementation
Construction Phase (Installation of Transformer)								
Training and capacity	Prevent of impacts through education	1. Implement training and awareness plan for IA/ESU//EO and contractors.	IA office, construction sites	Beginning of construction	After each event	No marginal cost	IA	ESU
Implement Noise and dust mitigation subplan	Dust Noise	2. Regularly apply wetting agents to exposed soil and access road. 3. Cover or keep moist all stockpiles of construction aggregates, and all truck-loads of aggregates. 4. As much as possible, restrict working time at substation site between 07:00 and 17:00. 5. Maintain equipment in proper working order. 6. Replace unnecessarily noisy vehicles and machinery. 7. Vehicles and machinery to be turned off when not in use. 8. Construct temporary noise barriers around excessively noisy activity areas where possible.	Substation, access road	Fulltime	Monthly	No marginal cost	IA/ESU	contractor
Implement Construction traffic sub-plan	Traffic disruption, accidents, public injury	9. Schedule construction vehicle activity during light traffic periods along access road. 10. Post speed limits, and create dedicated construction vehicle roads or lanes. 11. Inform community of location of construction traffic areas, and provide them with directions on how to best co-exist with construction vehicles on their roads. 12. Demarcate additional locations where pedestrians can develop road crossings away from construction areas. 13. Increase road and walkway lighting where necessary for safety.	Access road	Fulltime	Monthly	No marginal cost	IA/ESU	contractor

Subproject Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Location	Timing	Activity Reporting	Estimated Cost[15] (USD)	Responsibility	
							Supervision	Implementation
Implement worker and public safety sub-plan	Public and worker injury, and health	14. Worker and public safety guidelines of MOLISA as well as the Environmental, Health and Safety Guidelines of the IFC/World Bank (2007) for Power Transmission and Distribution will be followed. 15. Speed limits suitable for the size and type of construction vehicles, and current traffic patterns will be developed, posted, and enforced on all roads used by construction vehicles. 16. Appropriate safety clothing and footwear will be mandatory for all construction workers. 17. Adequate medical services must be on site or nearby all construction sites. 18. Drinking water must be provided at all construction sites. 19. Sufficient lighting to be used during necessary night work. 20. All construction sites will be examined daily to ensure unsafe conditions are removed.	Substation, access road	Fulltime	Monthly	No marginal cost	IA/ESU	contractor
Waste production & management	Soil and groundwater contamination inside substation	21. An all waste management plan and procedures must be established to be supported by the DONRE-approved on and offsite waste disposal sites identified in pre-construction phase.	Inside Substation	continuous	Quarterly	O & M	IA/ESU	contractor
Operational Phase								
Operation of new substation	Increased risk of worker or public injury	1. Occupational health and safety regulations and guidelines of MOLISA will be applied to operations of substation.	At substation	Fulltime	Quarterly	O & M	PTC4	

D. Monitoring Plan

114. The brief environmental monitoring plan for the three phases of subproject implementation is provided in Table 21 which consists of environmental indicators, the sampling locations and frequency, method of data collection, responsible parties, and estimated costs.

115. The standards for ambient environmental quality (e.g., water and air quality) for Viet Nam listed in section II will guide the monitoring program. The environmental standards provided by the Environmental, Health and Safety Guidelines of the IFC/World Bank (2007) for Power Transmission and Distribution will be followed to supplement standards that are not provided by the Government.

Performance Monitoring

116. Performance monitoring is required to assess the overall performance of the EMP. A performance monitoring system is normally developed by the EA for the entire subproject. Selected indicators of major components of the environment that will be affected primarily by the construction phase are drawn from the mitigation and monitoring plans and summarized in Table 22.

E. Reporting

117. Regular reporting on the implementation of mitigation measures and monitoring activities is the responsibility of IA/ESU and will be conducted in conjunction with regular meetings with stakeholders as part of the continuation of stakeholder communications. The mitigation and monitoring plans (Table 20 and Table 21) summarize proposed timing of reporting.

118. A report on environmental monitoring and implementation of EMP will be prepared quarterly for the EA by the IA/ESU. The IA/ESU report will also be sent to the DONRE. The reports will table all indicators measured with the monitoring plan of EMP including performance monitoring indicators (Table 22), and will include relevant Government environmental quality standards.

119. EA/IA will prepare and submit periodic environment monitoring reports to ADB as provided in the legal agreements (at the minimum on a semi-annual basis during the construction stage and on an annual basis during the operation stage). The monitoring reports will be disclosed on ADB website upon receipt by ADB following the ADB Public Communications Policy (2011).

Table 21. Environmental monitoring plan for the 220 kV Tra Vinh substation

ENVIRONMENTAL EFFECTS MONITORING							
Environmental Indicators	**Location**	**Means of Monitoring**	**Frequency**	**Reporting**	**Responsibility**		**Estimated Cost (USD)**
					Supervision	**Implementation**	
Pre-construction Phase – Review Baseline Conditions							
Qualitative air quality: dust, noise, groundwater & soil quality	At transformer site in substation, and along access road	Using field and analytical methods approved by DONRE.	One day and one night measurement for air,1 sample of groundwater an soil quality	One baseline supplement report before construction phase starts	IA/ESU	ESU	$1,000.
Construction – installation of new transformer into Tra Vinh substation							
Qualitative air quality: dust, noise, vibration, and hazardous waste spills	Baseline sites of pre-construction phase.	Using field and analytical methods approved by DONRE., and visual observation, for compliance with GoV environmental standards (section II D)	Quarterly during construction periods, or monthly after a spill or leak. Daily visual records	Monthly	IA/ESU	IA/ESU	$ 500./yr
Domestic (worker) and construction solid waste and wastewater inside and outside substation.	All construction sites and worker camps		Monthly	Monthly	IA/ESU	IA/ESU	$ 500./yr
Public comments and complaints	Using hotline number placed at construction areas	Information transferred by telephone hotline number posted at all construction sites.	Continuous public input	Monthly	IA/ESU	IA/ESU	no marginal cost
Incidence of worker or public accident or injury, including vehicles condition and operating permit compliance with local laws	At all construction areas	Regular reporting by contractors/ ESU, and permit compliance reporting	Continuous	Daily observation	IA/ESU	contractor	no marginal cost
Operation of new transformer in Tra Vinh substation							
Incidence of worker accidents, or spills on hazardous materials, and EMF[17]	inside substation near transformers	Using field and analytical methods approved by DONRE., & visual observation, GoV environmental standards	Continuous	Quarterly	PTC4		O and M
Ambient noise, dust, along access road and inside substation	Substation property and road		Continuous	Quarterly	PTC4		$500/yr
Groundwater and soil quality near transformers	Substation property and road		Once a year and when any leak/spill is detected.	Quarterly	PTC4		$500/yr

[17] EMF levels will fall within required levels as per GoV Law, and the IFC/WB E,H, & S Guidelines for Power Transmission and distribution

Table 22. Performance monitoring indicators for Tra Vinh subproject

Environmental Component	Key Indicator	Performance Objective	Data Source
Pre-construction Phase			
Public Consultation and Disclosure	Affected public and stakeholders	Meetings with public stakeholders contacted during IEE and new stakeholders convened for follow-up consultation and to introduce GRM	Minutes of meeting, and participants list
EMP	Final EMP	All stakeholders contacted during IEE re-contacted for follow-up consultation	EMP
Bid Documents	Requirements of EMP (CEMP[18])	EMP appended to bidding documents with clear instructions to bidders for CEMP	Bid documents
Training of IA/ESU	Training course(s) and schedule	By end of pre-construction phase, required course(s) that will be delivered are designed and scheduled	Course(s) outline, participants, and schedule
Construction Phase			
Air quality	Visual dust and noise	Levels never exceed pre-construction baseline levels	IA/ESU and contractor monitoring reports,
Public and worker safety	Frequency of injuries	Adherence to Government occupational health and Safety regulations[19]	Contractor reports
Traffic	Frequency of disruptions and blocked roadways	Disruptions, stoppages, or detours are managed to absolute minimum.	Public input, contractor reports,
Operation of Tra Vinh substation			
Worker and Public Safety	Frequency of accidents and spills	No increase in pre-construction frequency	PTC4

F. Estimated Cost of EMP

120. The marginal costs for implementing the EMP are primarily for environmental monitoring because the costs for implementing impact mitigation measures are included with the construction costs in Contractor bid documents. The preliminary cost for the implementation of the EMP for the subproject including an estimated environmental training budget for NPT / PPBM is approximately USD $9,000.00 which is summarized in Table 23. These costs are primarily for field sampling which include professional per diems of technicians.

Table 23. Estimated costs for Environmental Monitoring Plan of EMP

Activity Type	Estimated Cost (USD)
Pre-construction Phase	
Updating Environmental Baseline	
cultural receptors	no cost
environmental quality	$1,000.00
Construction Phase	
environmental quality	$2,000.00
public consultation	no cost
Operation Phase	

[18] CEMP developed from EMP in contractor bidding document.

[19] OSH Guidelines provided by MOLISA, *or* IFC World Bank EHS (2007) *for* Electric Power Transmission & Distribution

environmental quality	$1,000.00
public input	no cost
Training and capacity development of NPT / PPBM / ESU	$5,000.00
Total	**$9,000.00**

121. An estimated budget of USD $5,000.00 is required for training of the EA/IA/ESU on environmental assessment and management, and the implementation of the EMP. The estimated costs of the EMP and training will need to be updated by the IA/ESU during the pre-construction phase.

X. EMERGENCY RESPONSE PLAN

122. The Contractor must develop emergency or incident response procedures during construction and operation phases of the new 220 kV Tra Vinh substation and connector lines to protect workers and the public. The ERP outlines the roles and responsibilities of persons from first identification of an incident or emergency to the final steps of safe and complete closure of the situation (The detailed requirements for the ERP are described in Appendix D).

XI. INSTITUTIONAL CAPACITY REVIEW AND NEEDS

123. Currently there is insufficient experience and capacity for environmental assessment and management in SPPMB for the implementation of the EMP, and to develop future safeguards for the non-core subprojects. The ESU/IA of the subproject will develop and deliver training courses to the IA staff including the EO of the Contractor. The purpose of the course(s) is to strengthen the ability of the project owner including the ESU to oversee implementation of the EMP by construction Contractors, and EMC. Costs for training will be included with costs for implementation of the EMP.

124. Training on the implementation of an EMP will address two thematic areas. The first area will be principles environmental assessment and management focused on the potential impacts of subproject activities on the natural and social environment. The second area will be environmental safeguard requirements of the ADB and Government with specific reference to the EMP.

XII. CONCLUSIONS AND RECOMMENDATION

125. The initial examination of the 220 kV Tra Vinh substation indicates that potential environmental impacts are construction-related impacts and disturbances that can be mitigated and managed.

126. The public consultation meetings underscored the need for effective management of construction impacts such as noise, dust, traffic disruptions, and public safety. Follow-up meetings with the consulted stakeholders to address any construction-related issues are required. The civil construction impacts of elevated dust, noise, traffic disruptions, erosion and sedimentation, and public and worker safety can be managed effectively with standard construction practices (e.g., EHS Guidelines, IFC/World Bank Group, 2007, for Electric Power Transmission & Distribution.

127. The IEE concludes that the description of the feasibility design of the subproject combined with available information on the affected environment is sufficient to identify the scope of potential environmental impacts of the subproject. Providing that significant changes do not occur to the design of one or more of the subproject components, and that new sensitive environmental or PCR components are not identified in pre-construction phase, further detailed EIA of the subproject is not required.

XIII. REFERENCES CITED

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- ✓ PECC3, 2014.220 kV Tra Vinh substation EIA Report.
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- ✓ Tra Vinh Province, Statistical Yearbook, 2013.
- ✓ World Bank Group, 2007. Environmental, Health, and Safety Guidelines. Washington DC.,Power Transmission and Distribution, 96 pgs.

APPENDIX A: RAPID ENVIRONMENTAL ASSESSMENT OF SUBPROJECT

Rapid Environmental Assessment Checklist Power Transmission

Country/Project Title: Preparation for Tranche 3 as part of the MFF Power Transmission Investment Program financed by ADB: Second transformer bank for 220 kV TraVinh

Sector / Division: Energy / SEEN

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?			
▪ CULTURAL HERITAGE SITE		X	
▪ PROTECTED AREA		X	
▪ WETLAND		X	
▪ MANGROVE		X	
▪ ESTUARINE		X	
▪ BUFFER ZONE OF PROTECTED AREA		X	
▪ SPECIAL AREA FOR PROTECTING BIODIVERSITY		X	
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE…			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		X	

Screening Questions	Yes	No	Remarks
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		X	
▪ noise and vibration due to blasting and other civil works?	X		Minimal noise is anticipated during installation of transformer. EMP prescribes noise and dust mitigation plans. There will be no blasting..
▪ dislocation or involuntary resettlement of people?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?	X		Minor potential impact. The EMP includes mitigation measures for managing traffic caused by construction to prevent of minimize disturbance to regular traffic and local community
▪ hazardous driving conditions where construction interferes with pre-existing roads?	X		As above mitigation measures EMPs exists for managing construction truck traffic to prevent of minimize disturbance to regular traffic and local community
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	See RP
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	
▪ facilitation of access to protected areas in case corridors traverse protected areas?		X	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	
▪ social conflicts if workers from other regions or countries are hired?		X	
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		X	
▪ risks to community safety associated with maintenance of lines and related facilities?		X	

Screening Questions	Yes	No	Remarks
▪ community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?		X	Human health effects of EMF have not been established by international medical community (see Appendix of IEE). Land subsidence, lowering of groundwater table and salinization are not expected to occur .
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		X	
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	X		Minimal risks if any. Information campaign will be provided to community prior to and during construction. EMP will have provisions to reduce or mitigate these impacts.

Checklist for Preliminary Climate Risk Screening

Country/Project Title: Preparation of Tranche III of MFF for Power Distribution Development Project: Second transformer bank for 220 kV Tra Vinh substation

Sector: Power Transmission

Subsector: Transmission

Division/Department: SEEN / SERD

Screening Questions		Score	Remarks
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	No
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	No
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Result of Initial Screening (Low, Medium, High): Low

Other Comments: n/a

APPENDIX B: MINUTES AND PARTICIPANTS OF PUBLIC CONSULTATIONS

Table 24. The summary of public consultation meeting and number of participants

No.	Name of subprojects	Location	Date	Participants		
				Male	Female	Total
1	220 kV Tra Vinh Substation	Luong Hoa Commune, Chau Thanh District, Tra Vinh Province	20 March 2015	7	8	15

B.1: PUBLIC CONSULTATION OF LUONG HOA COMMUNE

a. LIST OF PARTICIPANTS

Date (Ngàytháng) : 20 March 2015
Location (địađiểm) : Luong Hoa Commune, Chau Thanh District, Tra Vinh Province

No. TT	Họvàtên (Name)	Nam (M)	Nữ (F)	Chứcvụ (Position)	Cơquan/Địachỉ (Organization/Address)	Chữký (Signature)
1	Tran Thi Trang		X		Ba Se A Hamlet	
2	Tran Thi Suong		X		Ba Se A Hamlet	
3	Thach Sa My		X		Ba Se A Hamlet	
4	Lam Anh Vu		X		Tra De Hamlet	
5	Thach Tieu Thuong	X			Ba Se A Hamlet	
6	Tran Van Khanh	X			Ba Se A Hamlet	
7	Lam Trom	X			Ba Se A Hamlet	
8	Lam Xay	X			Ba Se A Hamlet	
9	Thach Sa Reme	X			Ba Se A Hamlet	
10	Lam Thi My Le		X		Ba Se A Hamlet	
11	Thach Thi Thien		X		Ba Se A Hamlet	
12	Kim Suong	X			Ba Se A Hamlet	
13	Thach Mui	X		Head	Ba Se A Hamlet	
14	Nguyen Thu Thuy		X	Vice Chairperson	Communal People's Committee	
15	Nguyen Thi Thanh Thoang		X	Vice Chair person	Communal Women's Union	

b. MINUTES OF MEETINGS AND PHOTOS – LUONG HOA COMMUNE

TA-7742 VIE: Power Transmission Investment Program (MFF)
CHƯƠNG TRÌNH ĐƯỜNG DÂY TRUYỀN TẢI ĐIỆN (MFF)

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự Do - Hạnh phúc
--------***--------

Lương Hòa, Ngày 20 tháng 03 năm 2015

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG VỀ ĐÁNH GIÁ MÔI TRƯỜNG, TÁI ĐỊNH CƯ VÀ PHÁT TRIỂN DÂN TỘC THIỂU SỐ

Tiểu dự án: Lắp MBA thứ 2 TBA 220kV Trà Vinh

Xã Lương Hòa, Huyện Châu Thành, Tỉnh Trà Vinh

1. Thành phần tham dự

- Ông/Bà Nguyễn Thu Thủy ..... Chức vụ PCT UBND .....
- Ông/Bà Nguyễn Thị Thanh Thanh ... Chức vụ PCT - Hội phụ nữ
- Ông/Bà Thạch Mai ..... Chức vụ Trưởng ban nhân dân ấp Bến A
- Ông/Bà Huỳnh Ngọc Vân ..... Chức vụ PCT - MTTQ .....
- Ông/Bà Huỳnh Văn Tâm ..... Chức vụ Bí thư xã Đoàn
- Ông/Bà Nguyễn Văn Thạnh ..... Chức vụ Trưởng công an xã
- Đại diện những người bị ảnh hưởng: .....người (*chi tiết xem danh sách đính kèm*)

I. Nội dung tham vấn

- ***Tư vấn thiết kế giới thiệu dự án***: Lắp MBA thứ 2 TBA 220kV Trà Vinh trên địa bàn xã.
- ***Tư vấn môi trường trình bày về:*** Chính sách môi trường của ADB; Các quy định về môi trường trong ngành điện của chính phủ Việt Nam; Các tác động về môi trường và các biện pháp giảm thiểu tương ứng (như trong IEE); Cơ chế khiếu nại khi có các vấn đề môi trường xảy ra.

III. Ý kiến thảo luận

III.1 Về các tác động môi trường tiêu cực và biện pháp giảm thiểu

- Có biện pháp giảm thiểu của thủy thoát nước đến ruộng của các hộ xung quanh.
- Đến chiều của TBA 220 kV Trà Vinh ảnh hưởng đến phát triển lưới của hộ Lâm Thị Mỹ Hệ.

TA-7742 VIE: Power Transmission Investment Program (MFF)
CHƯƠNG TRÌNH ĐƯỜNG DÂY TRUYỀN TẢI ĐIỆN (MFF)

PUBIC CONSULTATION ON ENVIRONMENT AND SOCIAL/RESETLEMENT

THAM VẤN CỘNG ĐỒNG VỀ MÔI TRƯỜNG
LIST OF PARTICIPANTS
DANH SÁCH NGƯỜI THAM DỰ

Date (Ngày tháng) : 20/3/2015
Location (địa điểm) : UBND xã Lương Hoà, H. Châu Thành, Tỉnh Trà Vinh

No. TT	Họ và tên (Name)	Nam (M)	Nữ (F)	Chức vụ (Position)	Cơ quan/Địa chỉ (Organization/Address)	Chữ ký (Signature)
1	Trần Thị Trang		✓		BCA,	
2	Trần Thị Sương		✓		BCA,	Sương
3	Thạch Sa Mỹ		✓		BCA, 60	
4	Lâm Anh Vũ		✓		Trà Dê, ĐHA	
5	Thạch Tiểu Thường	✓			39/56	
6	Trần Văn Khánh	✓				
7	Lâm Trân	✓			Base 'A'	
8	Lâm Xây	✓				
9	Thạch Sa Rème	✓				
10	Lâm Thị Mỹ Lệ		✓			
11	Thạch Thị Thiên		✓			
12	Kim Sương	✓			BaseA, Lương Hòa	
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						

APPENDIX C: EIA APPROVAL LETTER FOR TRA VINH SUBSTATION

ỦY BAN NHÂN DÂN **TỈNH TRÀ VINH**	**CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM** **Độc lập - Tự do - Hạnh phúc**
Số: 47 /QĐ-UBND	*Trà Vinh, ngày 13 tháng 01 năm 2015*

QUYẾT ĐỊNH

Về việc phê duyệt Báo cáo đánh giá tác động môi trường của Dự án "Lắp máy biến áp thứ 2 Trạm biến áp 220 KV Trà Vinh"

CHỦ TỊCH ỦY BAN NHÂN DÂN TỈNH TRÀ VINH

Căn cứ Luật tổ chức Hội đồng nhân dân và Ủy ban nhân dân ngày 26 tháng 11 năm 2003;

Căn cứ Luật Bảo vệ môi trường ngày 29 tháng 11 năm 2005;

Căn cứ Nghị định số 29/2011/NĐ-CP ngày 18 tháng 4 năm 2011 của Chính phủ quy định về đánh giá môi trường chiến lược, đánh giá tác động môi trường, cam kết bảo vệ môi trường;

Căn cứ Thông tư số 26/2011/TT-BTNMT ngày 18 tháng 7 năm 2011 của Bộ trưởng Bộ Tài nguyên và Môi trường quy định chi tiết một số điều của Nghị định số 29/2011/NĐ-CP ngày 18 tháng 4 năm 2011 của Chính phủ quy định về đánh giá môi trường chiến lược, đánh giá tác động môi trường, cam kết bảo vệ môi trường;

Xét nội dung Báo cáo đánh giá tác động môi trường của Dự án "Lắp máy biến áp thứ 2 Trạm biến áp 220 KV Trà Vinh" đã được bổ sung, chỉnh sửa hoàn chỉnh gửi kèm Công văn số 9360/AMN-ĐB ngày 30 tháng 12 năm 2014 của Ban Quản lý Dự án các công trình Điện miền Nam;

Xét Tờ trình số 03/TTr-STNMT ngày 07 tháng 01 năm 2015 của Giám đốc Sở Tài nguyên và Môi trường về việc đề nghị phê duyệt Báo cáo đánh giá tác động môi trường Dự án "Lắp máy biến áp thứ 2 Trạm biến áp 220 KV Trà Vinh" và Biên bản họp Hội đồng thẩm định báo cáo đánh giá tác động môi trường ngày 02/12/2014,

QUYẾT ĐỊNH:

Điều 1. Phê duyệt Báo cáo đánh giá tác động môi trường của Dự án "Lắp máy biến áp thứ 2 Trạm biến áp 220 KV Trà Vinh" do Ban Quản lý Dự án các công trình Điện miền Nam làm chủ đầu tư với những nội dung chủ yếu như sau:

1. Phạm vi, quy mô và công suất của Dự án:

- Vị trí thực hiện dự án: Dự án thực hiện trong khuôn viên trạm 220 KV Trà Vinh hiện hữu nằm trên Quốc lộ 60 thuộc xã Lương Hòa, huyện Châu Thành, tỉnh Trà Vinh.

- Quy mô và công suất:

+ Lắp thêm máy biến áp 220KV-125MVA, nâng công suất trạm từ 1x125MVA lên 2x125MVA.

+ Máy biến áp lực: 225 ± 8x1,25%/115/23KV – 125MVA.

+ Sơ đồ phía 220 KV: Sử dụng sơ đồ hiện hữu, lắp bổ sung thêm 01 ngăn cho máy biến áp thứ 2.

+ Sơ đồ phía 110 KV: Sử dụng sơ đồ hiện hữu, lắp bổ sung thêm 01 ngăn cho máy biến áp thứ 2, 01 ngăn lộ đi Long Đức và đưa vào vận hành 01 ngăn lộ đi Cầu Kè đã lắp đặt thiết bị trong giai đoạn 1.

+ Sơ đồ phía 22 KV: Sử dụng sơ đồ hiện hữu, không bổ sung thêm ngăn lộ.

2. Yêu cầu bảo vệ môi trường đối với Dự án:

2.1. Có giải pháp đảm bảo an toàn trong giai đoạn vận chuyển, thi công và giai đoạn dự án đi vào vận hành.

2.2. Tổ chức thu gom, vận chuyển và xử lý toàn bộ chất thải rắn thông thường và chất thải nguy hại phát sinh trong quá trình thực hiện dự án theo đúng quy định; tuân thủ nghiêm ngặt các quy định của pháp luật hiện hành về môi trường nước, không khí, tiếng ồn, độ rung và điện từ trong quá trình thi công, vận hành dự án.

2.3. Thực hiện nghiêm túc các biện pháp bảo vệ môi trường, chương trình giám sát môi trường đã được nêu trong báo cáo đánh giá tác động môi trường và lưu giữ số liệu để các cơ quan quản lý nhà nước về bảo vệ môi trường tiến hành kiểm tra.

3. Các điều kiện kèm theo:

3.1. Phối hợp với các cơ quan chức năng quản lý giao thông và chính quyền địa phương để thống nhất kế hoạch thi công đường dây tại những điểm giao cắt với đường bộ; lắp đặt biển báo hoặc có hình thức thông báo kế hoạch phân luồng giao thông đến các chủ phương tiện giao thông trong thời gian kéo dây vượt đường bộ.

3.2. Tuân thủ các quy định pháp luật về điện, phòng chống cháy nổ trong quá trình thi công, vận hành dự án.

Điều 2. Chủ dự án có trách nhiệm sau đây:

1. Lập, phê duyệt và niêm yết công khai kế hoạch quản lý môi trường của Dự án trước khi triển khai thực hiện Dự án.

2. Thực hiện nghiêm túc các yêu cầu về bảo vệ môi trường quy định tại khoản 2, 3 Điều 1 Quyết định này và các trách nhiệm khác theo quy định của pháp luật về bảo vệ môi trường.

Điều 3. Trong quá trình thực hiện nếu Dự án có những thay đổi so với nội dung của Báo cáo đánh giá tác động môi trường và nội dung của Quyết định này, chủ dự án phải có văn bản báo cáo và chỉ được thực hiện những thay đổi sau khi có văn bản chấp thuận của Ủy ban nhân dân tỉnh Trà Vinh.

Điều 4. Quyết định phê duyệt báo cáo đánh giá tác động môi trường của Dự án là căn cứ để quyết định việc đầu tư Dự án; là cơ sở để các cơ quan quản

lý nhà nước có thẩm quyền kiểm tra, thanh tra việc thực hiện công tác bảo vệ môi trường của dự án.

Điều 5. Ủy nhiệm Sở Tài nguyên và Môi trường thực hiện kiểm tra, giám sát việc thực hiện các nội dung bảo vệ môi trường trong báo cáo đánh giá tác động môi trường đã được phê duyệt tại Quyết định này.

Điều 6. Chánh Văn phòng Ủy ban nhân dân tỉnh; Giám đốc các Sở: Tài nguyên và Môi trường, Kế hoạch và Đầu tư, Công thương; Chủ tịch Ủy ban nhân dân huyện Châu Thành, Chủ tịch Ủy ban nhân dân xã Lương Hòa, Thủ trưởng các cơ quan có liên quan và Giám đốc Ban Quản lý Dự án các công trình Điện miền Nam căn cứ quyết định thi hành.

Quyết định này có hiệu lực thi hành kể từ ngày ký./.

Nơi nhận:
- Bộ TN&MT;
- CT, các PCT.UBND tỉnh;
- Như Điều 6;
- PCVP Nguyễn Thanh Tâm;
- Lưu: VT, PNC NN.44bản.

KT. CHỦ TỊCH
PHÓ CHỦ TỊCH

Nguyễn Văn Phong

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APPENDIX D: EMERGENCY RESPONSE PLAN (ERP)

The Contractor must develop emergency or incident response procedures (ERP) during construction. In the operational phase the operator/civil authorities will have responsibility for any emergencies or serious incidents. The construction phase will ensure:

i) Emergency Response Team (ERT) of the Contractor as initial responder;
ii) the District fire and police departments, emergency medical service, the Department of Public Health, collectively referred to as the External Emergency Response Team (EERT), as ultimate responders.

The Contractor will provide and sustain the required technical, human and financial resources for quick response during construction.

Table 25. Roles and Responsibilities in Emergency Incident Response

Entity	Responsibilities
Contractor Team (ERT)	- Communicates / alerts the EERT. - Prepares the emergency site to facilitate the response action of the EERT, e.g., vacating, clearing, restricting site. - When necessary and requested by the EERT, lends support / provides assistance during EERT's response operations.
External Emergency Response Team (EERT)	- Solves the emergency/incident
Contractor Resources	- Provide and sustain the people, equipment, tools and funds necessary to ensure Subproject's quick response to emergency situations. - Maintain good communication lines with the EERT to ensure prompt help response and adequate protection, by keeping them informed of Subproject progress.

The ERT will be led by the senior Contractor engineer (designated ERTL) on site with a suitably trained foreman or junior engineer as deputy. Trained first-aiders and security crew will be the core members of the ERT.

The Contractor will ensure that ERT members are physically, technically and psychologically fit for their emergency response roles and responsibilities.

Prior to the mobilization of civil works, the Contractor, through its Construction Manager, ERTL, in coordination with the EA/IA, will meet with the ultimate response institutions to discuss the overall construction process, including, but not limited to:

i) Subproject sites;
ii) construction time frame and phasing;
iii) any special construction techniques and equipment that will be used; i
iv) any hazardous materials that will be brought to and stored in the construction premise and details on their applications and handling/management system;
v) the Contractor's Emergency Management Plan
vi) names and contact details of the ERT members

The objective of this meeting is to provide the ultimate response institutions the context for:

i) their comments on the adequacy of the respective Emergency Management Plans

ii) their own assessment of what types, likely magnitude and likely incidence rate of potential hazards are anticipated
iii) the arrangements for coordination and collaboration.

To ensure effective emergency response, prior to mobilization of civil works, the Contractor will:

i) set up the ERT;
ii) set up all support equipment and facilities in working condition
iii) made arrangements with the EERT;
iv) conducted proper training of ERT members, and encouraged and trained volunteers from the work force; v) conducted orientation to all construction workers on the emergency response procedures and facilities, particularly evacuation procedures, evacuation routes, evacuation assembly points, and self-first response, among others; and vi) conducted drills for different possible situations.

To sustain effective emergency response throughout Subproject implementation an adequate budget shall be provided to sustain the capabilities and efficiency of the emergency response mechanism, the emergency response equipment, tools, facilities and supplies. Drills and reminders will take place regularly, the former at least every two months and the latter at least every month.

A. Alert Procedures

Means of communicating, reporting and alerting an emergency situation may be any combination of the following: i) audible alarm (siren, bell or gong); ii) visual alarm (blinking/rotating red light or orange safety flag); iii) telephone (landline); iv) mobile phone; v) two-way radio; and vi) public address system/loud speakers. Some rules relative to communicating/alerting will be:

i) Whoever detects an emergency situation first shall immediately :
   - call the attention of other people in the emergency site,
   - sound the nearest alarm, and/or
   - report/communicate the emergency situation to the ERT.
ii) Only the ERTL and, if ERTL is not available, the Deputy ERTL are authorized to communicate with the EERT. Exceptional cases to this rule may be necessary and will be defined in the Emergency Management Plans.
iii) When communicating/alerting an emergency to the EERT, it is important to provide them with at least: i) the type of emergency situation; ii) correct location of the emergency; ii) estimated magnitude of the situation; iii) estimated persons harmed; iv) time it happened; v) in case of a spill, which hazardous substance spilled; and vi) in case of fire and explosion, what caused it. Such details would allow the EERT to prepare for the appropriate response actions. For an effective reporting/alerting of an emergency situation:
iv) The names and contact details of the relevant persons and institutions will be readily available in, or near to, all forms of communication equipment, and strategically posted (at legible size) in all Subproject sites and vehicles:
   - Most relevant construction/operations staffs namely, the ERTL, Deputy ERTL, first-aiders, supervising engineers, foremen
   - EERT institutions/organizations
   - Concerned village authority/ies
   - IA Office, SS
v) All Subproject sites will have good access to any combination of audible and visual alarms, landline phones, mobile phones and two-way radio communication at all times.

vi) Contractor's construction vehicles will also be equipped with the appropriate communication facilities.

B. Emergency Response Situations

The following tables suggest general procedures that will be refined in the final EMP during detailed design, and described in more detail in the Emergency Management Plans of the Contractor.

Table 26. Evacuation Procedure

Procedure	Remarks
Move out as quickly as possible as a group, but avoid panic.	All workers/staff, sub-contractors, site visitors to move out, guided by the ERT.
Evacuate through the directed evacuation route.	The safe evacuation shall have been determined fast by the ERTL/Deputy ERTL and immediately communicated to ERT members.
Keep moving until everyone is safely away from the emergency site and its influence area.	A restricted area must be established outside the emergency site, all to stay beyond the restricted area.
Once outside, conduct head counts.	Foremen to do head counts of their sub-groups; ERTL/Deputy ERTL of the ERT.
Once outside, conduct head counts.	Foremen to do head counts of their sub-groups; ERTL/Deputy ERTL of the ERT.
Report missing persons to EERT immediately.	ERTL/Deputy ERTL to communicate with the EERT.
Assist the injured in evacuation and hand them over to the ERT first-aiders or EERT medical group	ERT to manage injured persons to ensure proper handling.
If injury warrants special care, DO NOT MOVE them, unless necessary and instructed/directed by the EERT.	ERTL/Deputy ERTL communicates with EERT to get instructions/directions in handling the injured.

Table 27. Response Procedure During Medical Emergency

Procedure	Remarks
Administer First Aid regardless of severity immediately.	▪ Fundamentals when giving First Aid: - Safety first of both the rescuer and the victim. - Do not move an injured person unless: - victim is exposed to more danger when left where they are, e.g., during fire, chemical spill - it would be impossible for EERT to aid victims in their locations, e.g., under a collapsed structure - instructed or directed by the EERT. ▪ First AID to be conducted only by a person who has been properly trained in giving First Aid.
Call the EERT emergency medical	▪ ERTL/Deputy ERTL or authorized on-site

Procedure	Remarks
services and/or nearest hospital.	emergency communicator
Facilitate leading the EERT to the emergency site.	▪ ERTL/Deputy ERTL to instruct: - an ERT member on- site to meet EERT in access road/strategic location. He/she shall hold orange safety flag to get their attention and lead them to site. - Other ERT members to clear access road for smooth passage of the EERT.
If applicable, vacate site and influence area at once, restrict site, suspend work until further notice.	▪ Follow evacuation procedure.

Table 28. Response Procedure in Case of Fire

Procedure	Remarks
Alert a fire situation.	▪ Whoever detects the fire shall immediately: - call the attention of other people in the site, - sound the nearest alarm, and/or - Foreman or any ERT member among the construction sub-group contacts the fire department (in this case it will be agreed on that it is alright for any ERT member in the sub-group to alert the fire department) - report/communicate the emergency situation to the ERTL/Deputy ERTL.
Stop all activities/operations and evacuate.	▪ All (non-ERT) workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
Activate ERT to contain fire/control fire from spreading.	▪ Guided by the training they undertook, ERT members assigned to mitigate the fire shall assess their own safety situation first before attempting to control fire spread.
Call the nearest fire and police stations and, if applicable, emergency medical services.	▪ When alerting the EERT, ERTL will give the location, cause of fire, estimated fire alarm rating, any injuries.
Facilitate leading the EERT to the emergency site.	▪ ERTL/Deputy ERTL to instruct: - an ERT member to meet the EERT in the access road or strategic location and lead them to the site. He/she shall hold the orange safety flag to get their attention and lead them to the site. - some ERT members to stop traffic in, and clear, the access road to facilitate passage of the EERT.
ERT to vacate the site as soon as their safety is assessed as in danger.	▪ Follow appropriate evacuation procedure.

APPENDIX E: ENVIRONMENTAL COMPLIANCE AUDIT OF TRA VINH SUBSTATION

ENVIRONMENTAL COMPLIANCE AUDIT
220 kV Tra Vinh Substation, Tra Vinh Province
for present day operations

SUBSTATION INFORMATION

Name and Type of facility:	220 kV Tra Vinh Substation
Name of Operating Power Company:	The Western Power Transmission Company under PTC4
Location:	Luong Hoa Commune, Chau Thanh District, Tra VinhProvince
Capacity of substation:	220kV/110kV

Transmitting power to:

- Tra Vinh 110kV Substation via Tra Vinh110kV transmission line
- Duyen Hai110kV Substation via Tra Vinh – Duyen Hai110kV transmission line
- CauKe110kV Substation via Tra Vinh – CauKe 110kV transmission line (not yet
- constructed)
- Long Duc110kV Substation (planned)

Receiving power from:

- 220 kV Vinh Long Substation via Tra Vinh – Vinh Long 220kV transmission lineDuyen Hai Thermal Power Center via Duyen Hai Thermal Power Plant – 220 kV Tra Vinh transmission line

Estimated population or area serviced by substation: mostly for industrial purposes, number of beneficiary people unidentified.

Audit and site investigation procedure

The environmental audit was made by the international and national environmental consultants during site visits in March and July of 2015. The audit results were then cross-checked with SPMB EO and PECC4 engineer consultants. The audit and investigation engaged discussions with the Substation operator at site and over phone calls and later email exchange.

Substation information

Tra Vinh dubstation is located on 23.7 ha. Also associated with PTC4 through Western Power Transmission Company no.2, the substation started operating in December 27 2012. The substation transmits 220 kV from Vinh Long 220 kV substation and Duyen Hai Thermal Power Center to distribute power to several 110 kV substations in the region including: Tra Vinh, Duyen Hai, Cau Ke and Long Duc.

The following are the major facilities at the Tra Vinh substation:

- 125/125/40MVA x 1
- 4 incoming 220kV feeders from Vinh Long 220kV Substation and Duyen Hai Center

- 4 outcoming 110kV feeders to 110kV substations
- SCADA communication system
- Fire control system
- Emergency oil tank
- Substation building with office and control room

The substation has a total of 12 staff and workers who operate and maintain the substation. The staff are assigned over three 8-hour shifts every day. They are not eligible to conduct major repairmen works which will be done by an authorized maintenance team of Western Power Transmission Company no.2. An Operational Manual and Work Conduct Policy for the substation were introduced for the substation. They include operation and maintenance procedures, emergency responses. and usage of toolkits.

ENVIRONMENTAL COMPLIANCE CHECKLIST

No.	Item	Yes	No	Remarks
1. Maintenance of Equipment				
1	Is there an oil containment area around transformers?	x		Oil Tank Volume: 120m^3
2	Is equipment maintenance being done frequently? How often?	x		Oil check conducted once a year
3	Is PCB-containing equipment still in the SS or not		x	
4	Is the SS doing the reliability check on the transformer regularly?	x		Done by PTC4 staff
5	When the SS is changing insulating oil of the transformer, is the oil being collected in a container (not to drip on land or discharge into canal)?	x		The oil will be collected in a container when changing insulating oil of the transformer
2. Waste Management				
1	Is domestic solid waste collected and disposed at regularly place?	x		
2	Does the SS register for hazardous management license	x		SS has a specified storage for temporary hazardous wastes with clear signage and protective equipment provided
3	Is hazardous waste collected and disposed by regulated organization?	X		
4	Is used oil being managed? And how	x		A specialized team in PTC4 is in charge of managing used oil
5	Are old and used equipment being disposed? How	x		A specialized team in PTC4 is in charge of managing used equipment. Leak detection and management is made routinely by the substation trained technicians.
6	Has the SS domestic wastewater treatment facilities? Describe	x		The operation of the substation creates 1.7m^3 of wastewater per day. The wastewater is then treated by biological technology in septic tank before discharging into nearby irrigation canal
7	Has the SS the facilities to prevent		x	The transformer is designed to work

No.	Item	Yes	No	Remarks
	noise? Describe			silently in accordance with international standard IEC-51. Noise measured at the running transformeris52.7dBA lower than the limit of 70dBA required in technical regulation on noise QCVN26:2010/BTN MT
8	Has the SS the facilities to prevent dust? Describe		x	Minimal amount of dust created during operation
3.	**Health and Safety**			
1	Are there safety warning signage within the site	x		
2	Are there safety guidelines?	x		
3	Have safety orientation and trainings been conducted for workers?	x		
4	Are workers wearing personal protective equipment (PPE)	x		
5	Does workers be aware on EMF and social diseases	x		
4.	**Permits and license/s to operate**			
1	Is the Environmental Certificate for this SS being obtained		x	Already obtained
2	What kind of permits on environment, fire safety are obtained for this SS	x		
5.	**EMF monitoring conducted**			
	Is the EMF level within the permitted standard?	x		
	Are there measures to prevent the EMF? Describe	x		PPEs are provided to protect workers. Work time is divided into shifts which do not excess 8 hours each and workers will be examined for EMF exposure once a year.
6.	**Air quality monitoring**			
	Is noise level met standard	x		
	Is dust level met standard	x		
7	Complaint resolution	x		Since the operation in 2012, the substation received only 01 complaint in 2014 on the adverse impact of lighting system on the growth of rice. Corrective actions had been made. According to the procedure, more serious complaints will be elevated to higher authority (PTC4) for resolution

Air quality at/near Tra Vinh substation including EMF

- Sampling locations: Within the substation
- Date of sampling: October 2, 2014

- Laboratory: Center for Environment and Energy

Table 29. Air Quality at Tra Vinh Substation

Location	Noise(dA)	Pollutant concentration(mg/m^3)			
		Dust	SO2	NO2	CO
At the transformer	52.7	0.175	0.056	0.044	2.87
In front of operation house	40	0.132	0.046	0.032	2.41
At the gate of substation	61.7	0.264	0.083	0.068	4.76
QCVN05:2013/BTNMT	**-**	**0.3**	**0.35**	**0.2**	**30**
QCVN26:2010/BTNMT	**≤70**	**-**	**-**	**-**	**-**

Notes: the quality of ambient air in the project area is within the allowable standards.

Wastewater in Tra Vinh substation

- Sampling location: At discharging gate after treatment
- Date of sampling: October 2, 2014
- Laboratory: Center for Environment and Energy

Table 30. Waste water quality at Tra Vinh Substation

No	Parameter	Unit	Result	QCVN14:2008/BTNMT, Colum B
1	pH	-	6.28	**5– 9**
2	TSS	mg/l	45	**100**
3	COD	mg/l	15	**15**
4	BOD_5	mg/l	29	**50**
5	Nitrate	mg/l	3.74	**50**
6	Phosphate	mg/l	0,38	**10**
7	Coliform	MPN/ml	2,700	**5,000**

Notes: All sampled parametersin domestic wastewater treated in the substation's septic tanks are within the limits allowed by column B - National technical regulations for domestic wastewater QCVN 14:2008/ BTNMT.

Findings and Observations

Tra Vinh Substation is managed by PTC4 and operated with a uniform procedure.

1. Measures to prevent oil spill and leaks from transformers

A 120m^3 emergency oil tank has been installed for the 1st transformer to prevent oil leaks and spillages. Its capacity suffices to contain all oil volume in the current transformer and the 2nd transformer to be constructed.

A separate emergency procedure for oil accidents was introduced to all staff of the Substation. They include:

- Report directly to Head/Deputy Head of the substation
- Isolate area of oil leaks and spillages.
- Notify PTC4 to proceed with replacing and repairing equipment and troubleshooting leaks and spillages.

- Collect the oil if the oil spill from the tank, prevent oil from affecting the aquatic environment and the community
- Notify specialized unit to collect, transport and process the trapped oil in the oil tank.

2. Implementation of safety policies and procedures

- Safety signage is found all around the transformer and switchyard area. The whole substation is wall-fenced to avoid unauthorized entry. The PTC4 conducts safety training to all staff every year. Monthly training and notifications of safety measures and regulations are conducted to staff by Head of the Substation.
- When the workers were asked about their awareness of the safety policies, they said that they are fully aware of the safety policies and that they are required to strictly observe the safety procedures. It was observed that all of the workers are wearing PPEs and hard hats while moving around the switchyard.
- The substation monitors safety implementation by recording temperature on a daily basis, and radiation and EMF safety once a year

3. Maintenance of equipment

- Regular maintenance of equipment is done by PTC4. The maintenance team of Western Power Transmission Company No. 2 is responsible for Tra Vinh Substation. Oil samples are sent to the laboratory once a year. In case there is abnormal noise at the on/off time of the circuit breaker, the Substation will report to PTC4 and oil analysis is done to check the dielectric strength and moisture content.

4. Management of solid/ hazardous/liquid waste

- Hazardous wastes such as spent printer cartridges and old batteries are stored in a dedicated area within the substation. It will be collected and disposed of by a specialized company who is hired by PTC4.
- Solid waste is stored and managed separately and also handled by such hired company.
- No liquid waste is expected from the operation of the transformer. Oil leaks and spillages will be handled in conforming to oil incident procedures. Domestic wastewater is collected in containment and then disposed to the nearby canal after a simple filtering and treatment.

5. Management of fire incidents

- A system of water sprinkler of 4 water hoses is installed around the transformer. Portable fire extinguishers including CO_2 and powder are also equipped in key positions.

Corrective Action Plan: not required

CERTIFICATE OF
ENVIRONMENTAL PROTECTION COMMITMENT FOR TRA VINH SUBSTATION

Chau Thanh District People's Committee	**Socialist Republic of Vietnam**
No: 14/ GXN-UBND	**Independence- Freedom –Happiness**

Chau Thanh, August 27, 2007

CERTIFICATION
ENVIRONMENTAL PROTECTION COMMITMENT
For The Project: 220 kV Tra Vinh Substation

CHAIRMAN OF CHAU THANH DISTRICT PEOPLE'S COMMITTEE
CERTIFIES

Article 1. On August 23, 2007, SPPMB as Project Owner submitted Document No. 3409/CV-AMN-PDB (23 Aug 2007) to register the Environment Protection Commitment of 220 kV Tra Vinh Substation to be constructed in Ba Se A Hamlet, Luong Hoa Commune, Chau Thanh District, Tra Vinh Province.

Article 2. The Project Owner is responsible to implement fully and correctly environmental protection contents presented in the Environmental Protection Commitment.

Article 3. The Environmental Protection Commitment of the Project is the basis for Project Investment Decision and for the inspection and examination of environmental protection by authorized state agencies.

Article 4. This Certification takes effect from the date of signing.

Recipients:	ON BEHAFT OF DPC CHAIRMAN
	VICE CHAIRMAN
- Project Owner	
- For internal storing	Nguyen Van Tien
	Signed and Sealed

ỦY BAN NHÂN DÂN
HUYỆN CHÂU THÀNH

Số: 14 /GXN-UBND

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Châu Thành, ngày 27 tháng 8 năm 2007

GIẤY XÁC NHẬN ĐĂNG KÝ BẢN CAM KẾT BẢO VỆ MÔI TRƯỜNG

Của Dự Án: TRẠM BIẾN ÁP 220KV TRÀ VINH

CHỦ TỊCH ỦY BAN NHÂN NHÂN HUYỆN CHÂU THÀNH

XÁC NHẬN

Điều 1. Ngày 23 tháng 08 năm 2007 Chủ dự án là Ban quản lý dự án các công trình điện miền nam đã có Văn bản số 3409/CV-AMN-PĐB ngày 23 tháng 07 năm 2007 đăng ký bản cam kết bảo vệ môi trường của dự án Trạm biến áp 220KV Trà Vinh đặt tại Ấp Ba Se A - Xã Lương Hòa - Huyện Châu Thành - Tỉnh Trà Vinh.

Điều 2. Chủ dự án có trách nhiệm thực hiện đúng và đầy đủ những nội dung về bảo vệ môi trường nêu trong bản cam kết bảo vệ môi trường.

Điều 3. Bản cam kết bảo vệ môi trường của dự án là cơ sở để các cơ quan quản lý nhà nước về bảo vệ môi trường giám sát, kiểm tra, thanh tra việc thực hiện bảo vệ môi trường của Dự án.

Điều 4. Giấy xác nhận này có giá trị kể từ ngày ký./.

Chứng thực bản sao
đúng với bản chính
Số chứng thực 25739 Quyển số 4 SCT/BS
Ngày 20 -12- 2012
Chủ Tịch UBND Phường Cầu Kho Q.1

Nơi nhận:
- Chủ dự án;
- Lưu.

TM. ỦY BAN NHÂN DÂN HUYỆN
KT. CHỦ TỊCH
PHÓ CHỦ TỊCH

Phạm Văn Thêm

Nguyễn Văn Tiễn

APPENDIX F: HEALTH EFFECTS OF ELECTROMAGNETIC RADIATION

The popular concern of negative health effects of exposure to electromagnetic fields (EMF) originally arose from exposure to high voltage transmission lines. Today the concern of EMF has spread to exposure to personal electronic sources of EMF such as microwave ovens and cellular phones. The World Health organization (WHO) as part of their mandate for monitoring global human health with specific focus on developing countries recently conducted an extensive review and assessment http://www.who.int/peh-emf/en/ of the validity of the concerns of EMF.

Provided below is the recent review and critical summary conducted by WHO of the extensive research on human health and EMF which is reprinted verbatim below. The portion of the research database published in primary is referenced follows the summary.

In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level EMF. However, it is believed that some gaps in knowledge about biological effects exist and need further research.

a. Effects on general health:

Some members of the public have attributed a diffuse collection of symptoms to low levels of exposure to EMF at home. Reported symptoms include headaches, anxiety, suicide and depression, nausea, fatigue and loss of libido. To date, scientific evidence does not support a link between these symptoms and exposure to EMF. At least some of these health problems may be caused by noise or other factors in the environment, or by anxiety related to the presence of new technologies.

b. Effects on pregnancy outcome

Many different sources and exposures to EMF in the living and working environment, including computer screens, water beds and electric blankets, radiofrequency welding machines, diathermy equipment and radar, have been evaluated by the WHO and other organizations. The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to EMF, such as reports of prematurity and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community as being necessarily caused by the field exposures (as opposed to factors such as exposure to solvents).

c. Cataracts

General eye irritation and cataracts have sometimes been reported in workers exposed to high levels of radiofrequency and microwave radiation, but animal studies do not support the idea that such forms of eye damage can be produced at levels that are not thermally hazardous. There is no evidence that these effects occur at levels experienced by the general public.

d. Electromagnetic fields (EMF) and cancer

Despite many studies, the evidence for any effect remains highly controversial. However, it is clear that if EMF has an effect on cancer, then any increase in risk will be extremely small. The

results to date contain many inconsistencies, but no large increases in risk have been found for any cancer in children or adults.

A number of epidemiological studies suggest small increases in risk of childhood leukemia with exposure to low frequency EMF in the home. However, scientists have not generally concluded that these results indicate a cause-effect relation between exposure to the fields and disease (as opposed to artifacts in the study or effects unrelated to field exposure). In part, this conclusion has been reached because animal and laboratory studies fail to demonstrate any reproducible effects that are consistent with the hypothesis that fields cause or promote cancer. Large-scale studies are currently underway in several countries and may help resolve these issues.

e. Electromagnetic hypersensitivity and depression

Some individuals report "hypersensitivity" to electric or EMF. They ask whether aches and pains, headaches, depression, lethargy, sleeping disorders, and even convulsions and epileptic seizures could be associated with EMF exposure.

There is little scientific evidence to support the idea of electromagnetic hypersensitivity. Recent Scandinavian studies found that individuals do not show consistent reactions under properly controlled conditions of EMF exposure. Nor is there any accepted biological mechanism to explain hypersensitivity. Research on this subject is difficult because many other subjective responses may be involved, apart from direct effects of fields themselves. More studies are continuing on the subject.

f. The focus of current and future research

Much effort is currently being directed towards the study of EMF in relation to cancer. Studies in search for possible carcinogenic (cancer-producing) effects of power frequency fields is continuing, although at a reduced level compared to that of the late 1990's.

The long-term health effects of mobile telephone usage is another topic of much recent research. No obvious adverse effect of exposure to low level radiofrequency fields has been discovered. However, given public concerns regarding the safety of cellular telephones, further research aims to determine whether any less obvious effects might occur at very low exposure levels.

g. Key emergent points

- A wide range of environmental influences causes biological effects. 'Biological effect' does not equal 'health hazard'. Special research is needed to identify and measure health hazards.
- At low frequencies, external electric and magnetic fields induce small circulating currents within the body. In virtually all ordinary environment, the levels of induced currents inside the body are too small to produce obvious effects.
- The main effect of radiofrequency electromagnetic fields is heating of body tissues.
- There is no doubt that short-term exposure to very high levels of EMF can be harmful to health. Current public concern focuses on possible long-term health effects caused by exposure to EMF at levels below those required to trigger acute biological responses.
- WHO's International EMF Project was launched to provide scientifically sound and objective answers to public concerns about possible hazards of low level EMF.
- Despite extensive research, to date there is no evidence to conclude that exposure to low level EMF is harmful to human health.
- The focus of international research is the investigation of possible links between cancer and EMF, at power line and radiofrequencies.

Independent Published Research on Health Effects of EMF

- ✓ **Repacholi MH, Cardis E (1997)** Criteria for EMF health risk assessment. *Radiation Protection Dosimetry,* 72:305-312.
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- ✓ **Repacholi MH and Greenebaum B (eds) (1999)** Interaction of static and extremely low frequency electric and magnetic fields with living systems: Health effects and research needs. *Bioelectromagnetics,* 20:133-160.
- ✓ **Foster KH, Vecchia P, Repacholi MH (2000)** Science and the precautionary policy. *Science,* 288:979-981.
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- ✓ **Kheifets L, Greenberg R, Neutra R, Hester G, Poole C, Rall D, Banerjee G (2001)** From epidemiology to policy: An EMF case study. *American Journal of Epidemiology* 154(12): S50-59.
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- ✓ **Litvak E, Foster KR, and Repacholi MH (2002)** Health and safety implications of exposure to EMF in the frequency range 300 Hz to 10 MHz.,*Bioelectromagnetics,* 23(1):68-82.
- ✓ **Mezei G, Kheifets L (2002)** Clues to the possible viral etiology of childhood leukemia. *Technology* 9: 3-14.
- ✓ **Repacholi MH (2002)** Assessment of the Health Effects of EMF Exposure. *The Radio Science Bulletin* 301: 14-24.

- ✓ **Sahl J, Mezei G, Kavet R, McMillan A, Silvers A, Sastre A, Kheifets L (2002)** Occupational magnetic field exposures and cardiovascular mortality in a cohort of electric utility workers. *American Journal of Epidemiology* 156:913-918.
- ✓ **Dewhirst MW, Lora-Michiels M, Viglianti BL, Dewey WC, and Repacholi MH (2003)** Carcinogenic effects of hyperthermia.*International Journal of Hyperthermia,* 19(3):236-251
- ✓ **Goldstein LS, Dewhirst MW, Repacholi MH, and Kheifets L (2003)** Summary, conclusions and recommendations: adverse temperature levels in the human body, *International Journal of Hyperthermia,* 19(3):373-384
- ✓ **Kheifets L, Repacholi MH, and Saunders R (2003)** Thermal stress and radiation protection principles.*International Journal of Hyperthermia,* 19(3):215-224
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