

# Draft Initial Environmental Examination

---

June 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 Duc Hoa substation  
Long An Province, Viet Nam

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

### **NOTE**

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature. This document is being disclosed to the public prior to Board consideration in accordance with ADB's Public Communications Policy 2011. Subject to any revisions required following Board consideration, this document is deemed final.

## **CURRENCY EQUIVALENTS**

(as of 24 May 2015)

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

## **ABBREVIATIONS**

|         |   |
|---------|---|
| ADB:    | Asian Development Bank                              |
| AH:     | Affected Household                                  |
| AP:     | Affected people                                     |
| BOD:    | Biochemical Oxygen Demand                           |
| COD:    | Chemical Oxygen Demand                              |
| DoNRE:  | Department of Natural Resources and Environment     |
| DoLISA: | Department of Labour Invalids and Social Assistance |
| EA:     | Executing Agency                                    |
| ECA:    | Environmental Compliance Audit                      |
| EIA:    | Environment Impact Assessment                       |
| EMP:    | Environment Management Plan                         |
| EO:     | Environmental Officer                               |
| ESU:    | Environmental and Social Unit                       |
| GRM:    | Grievance Redress Mechanism                         |
| HCMC:   | Ho Chi Minh City                                    |
| IA:     | Implementing Agency                                 |
| IEE:    | Initial Environmental Examination                   |
| MoLISA: | Ministry of Labour Invalids and Social Assistance   |
| PCB:    | Polychlorinated biphenyls                           |
| PTC4:   | Power Transmission Company No. 4                    |
| PPC:    | Provincial Peoples Committee                        |
| REA:    | Rapid Environment Assessment                        |
| ROW:    | Right-of-way  |
| SPPMB:  | Southern Power Project Management Board             |
| TSS:    | Total Suspended Solids                              |
| UXO:    | Unexploded Ordnance                                 |

## **WEIGHTS AND MEASURES**

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

## **EXECUTIVE SUMMARY**

The National Power Transmission Corporation (NPT) of Viet Nam requested that an extension to the 220 kV Duc Hoa substation be included in Tranche III of Multi-tranche Financing Facility (MFF) for the Power Transmission Investment Program (PTIP) for Viet Nam. The goal of the PTIP is to develop and improve the quality and reliability of power supply throughout Viet Nam. The Second transformer bank for 220 kV Duc Hoa 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 Long An province with particular reference to needs of the districts of Duc Hoa, and Duc Hue and adjacent areas

Preliminary engineering designs, and safeguard requirements of the subproject have been completed including the approval of the EIA to meet the regulations of the Long An Provincial Department of Natural Resources and Environment (DONRE). The IEE presented herein was prepared pursuant to the ADB SPS (2009). The IEEs of the other eight subprojects of Tranche III were prepared separately.

### **Subproject Summary**

The major components of the subproject are summarized below.

- Installation of the second transformer into the 25.6 ha 220kV Duc Hoa substation, Bau Cong Hamlet, Tan My commune, Duc Hoa District, Long An province.
- Additional supporting equipment at the substation for fire prevention, i.e., fire extinguishers and emergency oil trap.

### **Potential Impacts and Mitigations**

The IEE of the Second transformer bank for 220 kV Duc Hoa 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, increased vehicle traffic and potential increased 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).

Because subproject will occur inside the existing Duc Hoa 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, critical habitat, or protected areas in the subproject site which is located in Long An. The substation is not near a national protected area. The sensitivity of the new transformer and entire substation to climate change is assessed as low.

The existing Duc Hoa substation in which the transformer will be installed is an associated facility of the transformer. An Environmental Compliance Audit of the substation was

conducted to ensure there are no environmental issues or risks associated with the substation. The ECA indicated that the relatively new 220 kV Duc Hoa substation meets all legal and regulatory requirements of Viet Nam for electric power operations for the protection of the environment.

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 for the construction sites and identifies the need for capacity development and training of the IA/ESU in environmental management and assessment as focused on the implementation of the EMP.

### **Conclusions**

The IEE concludes that the feasibility design of the Second transformer bank for 220 kV Duc Hoa substation combined with available information on affected environments is sufficient to identify the scope of potential environmental impacts of the subprojects. 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 environmental impact assessment (EIA) of the subproject is not required.

## TABLE OF CONTENTS

|   |                                     |
|---|-------------------------------------|
| EXECUTIVE SUMMARY   | 4                                   |
| Subproject Summary  | 4                                   |
| Potential Impacts and Mitigations                                   | 4                                   |
| Conclusions   | 5                                   |
| A. Introduction   | 9                                   |
| B. Assessment Context   | 9                                   |
| II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK                      | 9                                   |
| A. Viet Nam Regulatory Framework for Environmental Assessment       | 10                                  |
| B. Power Transmission Sector Regulatory Framework                   | 10                                  |
| C. ADB Safeguard Policy   | <b>Error! Bookmark not defined.</b> |
| D. Applicable Environmental Laws, Policy, Standards, and Guidelines | <b>Error! Bookmark not defined.</b> |
| III. SUBPROJECT DESCRIPTION   | 15                                  |
| A. Primary electrical component.                                    | 15                                  |
| B. Civil work.  | 15                                  |
| C. Supporting components  | 15                                  |
| IV. DESCRIPTION OF THE ENVIRONMENT                                  | 18                                  |
| A. Physical Environment   | 18                                  |
| B. Biological Environment   | 25                                  |
| C. Socioeconomic condition  | 26                                  |
| D. Additional features of 220 kV Duc Hoa substation                 | 30                                  |
| V. INFORMATION DISCLOSURE AND PUBLIC CONSULTATION                   | 33                                  |
| A. Information disclosure   | 33                                  |
| B. Public Consultation  | 33                                  |
| VI. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION                  | 37                                  |
| A. Subproject Benefits  | 37                                  |
| B. Pre-construction Phase   | 37                                  |
| C. Construction Phase   | 37                                  |
| D. Operation Phase  | 38                                  |
| E. Climate Change   | 38                                  |
| VII. ANALYSIS OF ALTERNATIVES                                       | 39                                  |
| VIII. PUBLIC GRIEVANCE REDRESS MECHANISM                            | 39                                  |
| A. Type of Grievances   | 39                                  |
| B. Grievance Redress Mechanism                                      | 39                                  |
| C. Legal Guarantees for Complaints and Grievances                   | 40                                  |
| IX. ENVIRONMENTAL MANAGEMENT PLAN                                   | 42                                  |
| A. Institutional Arrangements and Responsibilities                  | 42                                  |
| B. Summary of Potential Impacts of Subproject                       | 43                                  |
| C. Impact Mitigation Plan   | 44                                  |
| D. Monitoring Plan  | 49                                  |
| E. Reporting  | 49                                  |
| F. Estimated Cost of EMP  | 52                                  |

|       |  |    |
|-------|--|----|
| X.    | EMERGENCY RESPONSE PLAN  | 53 |
| XI.   | INSTITUTIONAL CAPACITY REVIEW AND NEEDS                          | 53 |
| XII.  | CONCLUSIONS AND RECOMMENDATION                                   | 54 |
| XIII. | REFERENCES CITED   | 54 |
|       | APPENDIX A: RAPID ENVIRONMENTAL ASSESSMENT OF SUBPROJECT         | 55 |
|       | APPENDIX B: MINUTES AND PARTICIPANTS OF PUBLIC CONSULTATIONS     | 59 |
|       | APPENDIX C: EIA APPROVAL LETTER FOR 220 KV DUC HOA SUBSTATION    | 64 |
|       | APPENDIX D: EMERGENCY RESPONSE PLAN                              | 66 |
|       | APPENDIX E: ENVIRONMENTAL COMPLIANCE AUDIT OF DUC HOA SUBSTATION | 71 |
|       | APPENDIX F: HEALTH EFFECTS OF ELECTROMAGNETIC RADIATION EMF      | 77 |

|  |  |    |
|--|--|----|
|  | Figure 1. 220 kV Duc Hoa substation.....                       | 17 |
|  | Figure 2. Plan view of new 220 kV Duc Hoa substation .....     | 17 |
|  | Figure 3. pH and SS in urban wastewater in Duc Hoa Town .....  | 23 |
|  | Figure 4. BOD and COD in urban wastewater in Duc Hoa Town..... | 24 |
|  | Figure 5. Features of 220 kV Duc Hoa substation site.....      | 30 |
|  | Figure 6. The Grievance Redress Mechanism .....                | 41 |

|  |   |                                     |
|--|---|-------------------------------------|
|  | Table 1. Directives for power sector in Viet Nam and Long An province                 | <b>Error! Bookmark not defined.</b> |
|  | Table 2. Applicable land development and construction law and policy                  | <b>Error! Bookmark not defined.</b> |
|  | Table 3. Temperature regime at some stations in Long An Province.....                 | 19                                  |
|  | Table 4. Average number of sunlight hours (hrs).....                                  | 19                                  |
|  | Table 5. Monthly mean humidity in Moc Hoa Station (%) .....                           | 19                                  |
|  | Table 6. Average Monthly Rainfall at Tan An and Moc Hoa Stations 2009-2013 (mm).....  | 20                                  |
|  | Table 7. Duc Hoa annual rainfall distribution (mm).....                               | 20                                  |
|  | Table 8. Average wind velocity in Long An province (m/s) .....                        | 20                                  |
|  | Table 9. Air pollutants measured at the Duc Hoa Substation.....                       | 21                                  |
|  | Table 10. Surface wastewater quality at Duc Hoa substation, 2014 .....                | 24                                  |
|  | Table 11. Measurement of electromagnetic field at Duc Hoa substation, 2014 .....      | 25                                  |
|  | Table 12. Duc Hoa District Land Use in 2015.....                                      | 26                                  |
|  | Table 13. Industrial zones in Duc Hoa district .....                                  | 27                                  |
|  | Table 14. Income and poverty in Duc Hoa district, 2014 .....                          | 27                                  |
|  | Table 15. Water supply in Duc Hoa District, 2015. ....                                | 29                                  |
|  | Table 16. Environmental Sensitive Receptors around the Substation .....               | 30                                  |
|  | Table 17. Summary of concerns and issues with subproject .....                        | 36                                  |
|  | Table 19. Summary of potential impacts of subproject .....                            | 43                                  |
|  | Table 20. Impact Mitigation Plan .....  | 45                                  |
|  | Table 21. Environmental monitoring plan for the 220 kV Duc Hoa substation .....       | 50                                  |
|  | Table 22. Performance monitoring indicators for Duc Hoa subproject .....              | 52                                  |
|  | Table 23. Estimated costs for Environmental Monitoring Plan of EMP .....              | 53                                  |
|  | Table 24. The summary of public consultation meeting and number of participants ..... | 59                                  |
|  | Table 25. Roles and Responsibilities in Emergency Incident Response.....              | 66                                  |
|  | Table 26. Evacuation Procedure .....  | 68                                  |
|  | Table 27. Response Procedure During Medical Emergency .....                           | 69                                  |

Table 28. Response Procedure in Case of Fire.....69



## **A. Introduction**

1. The National Power Transmission Corporation (NPT) of Viet Nam requested the a new transformer for the 220 kV Duc Hoa substation be included in Tranche III of the Multi-tranche Financing Facility (MFF) for the Power Transmission Investment Program (PTIP) for Viet Nam. The Duc Hoa subproject is one of nine individual subprojects that comprise Tranche III.

2. The goal of the PTIP is to develop and improve the quality and reliability of electrical power supply throughout Viet Nam. The Duc Hoa subproject will meet the immediate power needs of rapidly developing Long An industrial zones. The NPT is the executing agency of the subproject with the Southern Vietnam Power Projects Management Board (SPPMB) being the implementing agency.

3. The IEE presented herein was prepared pursuant to the requirements of the ADB SPS (2009). The IEEs of the other eight subprojects of Tranche III were prepared separately.

## **B. Assessment Context**

4. The Duc Hoa subproject was assigned Environmental Category B pursuant to the ADB's Safeguard Policy<sup>1</sup> and recent good practice sourcebook guidance<sup>2</sup>. 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 environmental management plan<sup>3</sup>. The results of the rapid environmental assessment (REA) of the subproject are in Appendix A.

5. The IEE was prepared for the Duc Hoa 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 LEP (2014) and Decree 18/2015/ND-CP has been completed and approved by the Duc Hoa Provincial Department of Natural Resources and Environment (DONRE) (Appendix C)

6. The detailed designs for the extension of the Duc Hoa subproject will follow after subproject approval. The Environmental Management Plan (EMP) will need to be reviewed to meet the final detailed designs of the subproject.

## **II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK**

7. The Second transformer bank for 220 kV Duc Hoa substation will be implemented according to the directives on use of Official Development Assistance (ODA) by GoV Decree No. 131/2006/ND-CP which was promulgated November 9, 2006, and in accordance with the provisions of for the parent Sector Project.

---

<sup>1</sup>ADB, 2009. Safeguard Policy Statement, ADB Policy Paper.

<sup>2</sup>ADB, 2012, Environmental Safeguards, A Good Practice Sourcebook, Draft.

<sup>3</sup>Footnote 6, pg 19.

## A. Viet Nam Regulatory Framework for Environmental Assessment

8. The recently revised Viet Nam Environment Protection Law No. 55/2014/QH13 of 23 June 2015 (LEP 2014) prescribes the requirements for environmental assessment for international and domestic project interventions that affect natural and social environments. Following the revised the LEP (2014) the supporting Government Decree 29/2011/ND-CP on strategic environmental assessment (SEA), and environmental impact assessment (EIA) was replaced with Decree 18/2015/ND-CP, dated 14 February 2015. Supporting Circular 26/2011/TT-BTNMT remains unchanged. Decree 18 and Circular 26 are implemented in conjunction with Decree 80/2006/ND-CP, and Decree 21/2008/ND-CP.

9. The screening criteria of Decree 18 distinguish projects that require a full EIA from comparatively simpler projects that require an IEE [formerly EPC]. The difference between the government (GoV) 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 the Decree 18 have changed and are now based on voltage. All projects undertaken with voltages exceeding 110 kV require EIAs.

10. Thus, the Second transformer bank for 220 kV Duc Hoa substation required a GoV EIA to satisfy the GoV regulatory framework. The EIA was prepared and approved in accordance with Viet Nam Law and approved by the Long An PPC on 31 December 2014. The GoV Environmental Compliance Certificate (ECC) for the subproject is found in Appendix C.

## B. Power Transmission Sector Regulatory Framework

11. 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**

| <b>Laws and Regulations</b>                             | <b>Description</b>  |
|---|---|
| <b>A. Law</b>   |   |
| Law No. 24/2012/QH13 issued on November 20, 2012        | Amends and supplements a number of articles of the Electricity Law No. 28/2004/QH11 of December 3, 2004   |
| Electricity Law No. 18/2004/QH11 dated December 3, 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>B. Decrees</b>                                       |   |
| Decree No 81/2009/ND-CP, issued August 17, 2005         | On the safety and protection of high-voltage power grids.   |
| Decree No 14/2014/ND-CP dated February 26, 2014         | Decree 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. |

| <b>Laws and Regulations</b>   | <b>Description</b>   |
|---|--|
| <b>C. Circular</b>  |  |
| Circular No 22/2010/BXD issued on December 3, 2010                                  | Regulation on 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, issued January 22, 2010 | Regarding protection on high-voltage power network   |

### **Land Development and Construction Regulatory Framework.**

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

**Table 1. Applicable land development and construction law and policy**

| <b>Laws</b>  | <b>Description</b>  |
|--|---|
| <b>A. Law</b>  |   |
| Land Law No 45/2013/QH13 dated November 29, 2013                   | This Law 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>B. Decrees</b>  |   |
| Decree No. 44/2014/ND-CP dated May 15, 2014                        | This Decree 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 dated May 15, 2014                        | The Decree details some articles of the Law on Land concerning compensation, support, and resettlement upon land expropriation by the State.  |
| <b>C. Circulars</b>  |   |
| Circular No. 36/2014 / TT-BTNMT dated June 30, 2014                | Specifying 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 dated June 30, 2014,                 | Providing detailed regulation on compensation, assistance, and resettlement when the State acquires land.   |
| Document of Prime Minister No. 1665/TTg-CN, dated October 17, 2006 | Regarding management of clearance of site, mine and explosive ordnance for construction   |

### C. ADB Safeguard Policy

13. The ADB Safeguard Policy Statement (ADB SPS, 2009) along with the recent good safeguard practice sourcebook clarify the rationale, scope and content of an 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).

14. 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 Environmental Impact Assessment 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 Initial Environmental Examination 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.

### D. Applicable Environmental Laws, Policy, Standards, and Guidelines

15. 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**

| <b>Laws and Regulations</b>  | <b>Description</b>   |
|--|--|
| <b>A. Laws</b>   |  |
| Law on Environmental Protection No. 55/2014/QH13, in effect on January 1, 2015 | 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 dated November 13, 2008                      | Pursuant to the 1992 constitution of the Socialist Republic of Vietnam, which was amended and supplemented under Resolution 5/2001/QH10 dated December 25, 2001 of the 10 <sup>th</sup> National Assembly, this law stipulates biodiversity conservation and sustainable development.                                  |
| <b>B. Decrees</b>  |  |
| Decree No. 18/2015/ND-CP, dated Feb. 14, 2015                                  | Provides the requirements for Environmental Protection Plan, Strategic Environmental Assessment, Environmental Impact Assessment and Environmental Protection Scheme. This Decree took effect on April 1, 2015.  |
| Decree No. 19/2015/ND-CP, dated Feb. 14, 2015                                  | Regulation detailing a number of articles of the Environmental Protection Law. This Decree took effect on April 1, 2015.   |
| Decree No 80/2014/ND-CP  | This Decree regulates drainage and treatment of wastewater   |

| <b>Laws and Regulations</b>                           | <b>Description</b>  |
|---|---|
| issued on August 6, 2014                              | 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 drainage and treatment of wastewater within Vietnam's territory.  |
| Decree No.179/2013/ND-CP dated November 14, 2013      | This Decree took effect on December 30, 2013 and prescribes the sanction on administrative violations on the domain of environmental protection.  |
| Decree No.59/2007/NĐ-CP dated April 9, 2007           | Prescribes the regulations on solid waste management  |
| <b>C. Circulars</b>                                   |   |
| Circular No.27/2015/TT-BTNMT dated May 29, 2019       | Guidance for Strategic Environmental Assessment, Environmental Impact Assessment, and Environmental Protection Plan.  |
| Circular No. 01/2012/TT-BTNMT dated March 16, 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 dated May 5, 2014       | Provides the guidelines for the implementation of the Government's Decree No. 35/2014/ND-CP of April 29, 2014, amending and supplementing a number of articles of the government's decree No. 29/2011/ND-CP of April 18, 2011, providing strategic environmental assessment, environmental impact assessment and environmental protection commitment. |
| Circular No 12/2011/TT-BTNMT dated April 14, 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 should be contracted through a registered hazardous waste management company.                               |
| Circular No. 39/2010/TT-BTNMT dated December 16, 2010 | National technical regulation on noise (QCVN 26/2010/BTNMT) and on vibration (QCVN 27/2010/BTNMT)   |
| Circular No 25/2009/TT-BTNMT dated November 16, 2009  | National technical regulation on hazardous waste threshold (QCVN 07:2009/BTNMT).  |
| Circular No 32/2013/TT-BTNMT dated October 25, 2013   | National technical regulation on ambient air quality (QCVN 05/2013/BTNMT)   |
| <b>D. Decisions</b>                                   |   |
| Decision No. 16/2008/QĐ-BTNMT dated December 31, 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)  |

## 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 coastalwater
- QCVN 14:2008/BTNMT–National technical regulations on quality of domesticwastewater
- 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 of heavy metals 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 Examination of Water and Wastewater

## International Environmental Management Conventions

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

- Stockholm Convention on Persistent Organic Pollutants (2002) see link [http://www.pops.int/documents/implementation/nips/submissions/nip\\_vietnam.pdf](http://www.pops.int/documents/implementation/nips/submissions/nip_vietnam.pdf)
- 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

17. The 220 kV Duc Hoa substation with a new transformer will improve its existing capacity to meet the peak load demand growth and socio-economic development of Long An province, mainly industrial demand in districts of Duc Hoa, Duc Hue and adjacent areas. The project will also provide power supply to several 110kV substations in the area, improve the reliability, power quality and create flexibility in the operation of the local grid.

2. The main work of this project is the installation of the second transformer and associated equipment in the same premise of the existing Duc Hoa 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.

3. The new transformer will be installed inside the 24.6 ha 220 kV Duc Hoa substation located in Bau Cong Hamlet, Tan My Commune, Duc Hoa District, Long An Province in southern Viet Nam north of the Mekong delta (Figure 1). It is bounded by a communal road to the north, gardens to the south and the east and the land property of Hong Phat Company to the west.

#### A. Primary electrical component.

18. The substation will be equipped with another 220/110/22kV power transformer with the following specifications:

- Capacity ratio: 220/110/22kV-250MVA
- Group of winding: YNa0d11
- High voltage winding: potential level  $225 \pm 8 \times 1,25\%$ /115/23kV

The 2nd transformer utilizes the diagram similar to the 1st one, which is described as below:

- 220kV side: the same system diagram with 02 busbars.
- 110kV side: the same system diagram with 02 busbars.
- 22kV side: the same system diagram with sectionalized busbar.

#### B. Civil work.

19. The civil works include ground preparation for the transformer, gate tower, electric box and cable trench. The substation layout is presented in Figure 2.

#### C. Supporting components

20. The fire protection system at this stage includes fire cooling sprinkler system, automatic misting system at 220 kV transformers and the primary fire prevention toolset such as portable fire extinguishers. The communication and SCADA system utilizes the existing configuration at the substation.

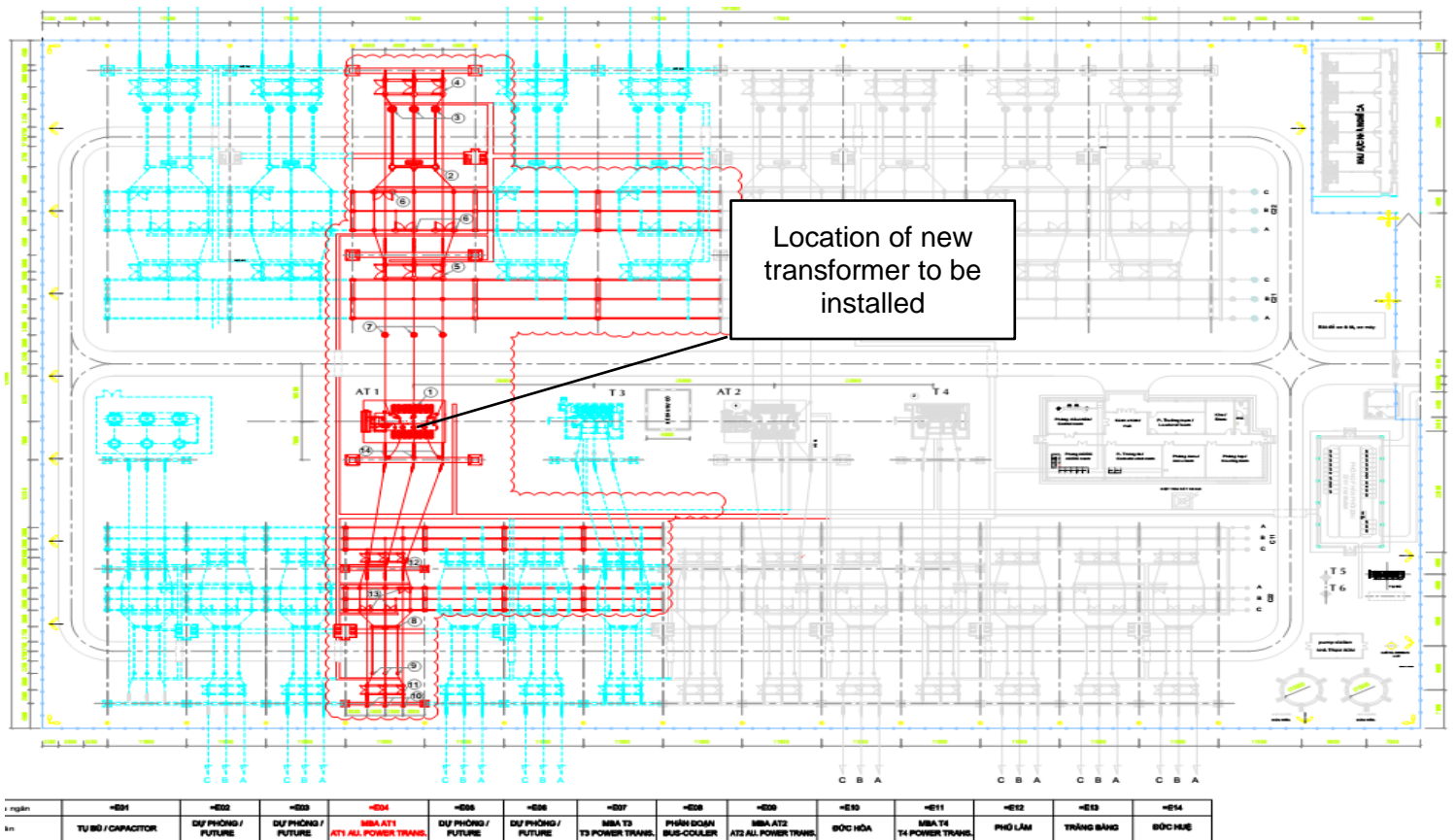




Figure 1.220 kV Duc Hoa substation



Figure 2. Plan view of new 220kV Duc Hoa substation



#### IV. DESCRIPTION OF THE ENVIRONMENT

##### A. Physical Environment

###### 1. Climate

21. The Duc Hoa substation is situated in the Southern Climate Zone which is typified by a tropical monsoon climate. Being situated between southeastern and southwestern sub-regions results in a combination of the unique climatic characteristics of the Mekong Delta and the Southern East. There are two seasons a year: the dry season from November to April while the rainy season is observed from May to October. In general, the province has abundant moisture, sunshine, and a narrow diurnal temperature range due to the subequatorial climate with monsoon.

###### a. Temperature

22. Ambient temperature is high and changes very little in annually. Average monthly temperature from 2009 – 2013 was 26.1 – 27.7°C (Table 3). The mean difference between the hottest month and the coldest month is about 4-5°C. The cool months of year are from December to January while the hot months are April and May.

**Table 2. Temperature regime at some stations in Long An Province**

| Stations | Monthly average temperature (°C) |       |       |       |       |       |       |       |       |      |       |       |
|----------|----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|
|          | Jan                              | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct  | Nov   | Dec   |
| Tan An   | 24.48                            | 25.04 | 26.48 | 28.06 | 27.5  | 27.3  | 26.46 | 26.58 | 26.42 | 26.5 | 26.14 | 25.14 |
| Moch Hoa | 23.94                            | 26.46 | 27.74 | 28.84 | 28.46 | 27.94 | 27.22 | 27.72 | 27.9  | 27.9 | 27.52 | 26.48 |

Source: Long An Statistical Yearbooks 2009-2013

23. 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 between 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 hours**

24. Average total number of sunlight hours in Duc Hoa are approximately 2.500-2.800 hours per year (Table 4).

**Table 3. Average number of sunlight hours (hrs)**

| Station | Mean for Month |     |     |     |     |     |     |     |     |     |     |     | Year Total |
|---------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|
|         | Jan            | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |            |
| Tan An  | 266            | 251 | 279 | 247 | 225 | 184 | 195 | 186 | 186 | 200 | 226 | 240 | 2686       |

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

**c. Humidity and Rainfall**

25. Average relative humidity in Long An is 80-82% (Table 5) In the dry season relative humidity is as low as 78%. The average evaporation is 1204.5 mm/year.

**Table 4. Monthly mean humidity in Moch Hoa Station (%)**

| Station  |     | Mean for Month |      |      |      |      |      |      |      |      |      |      | Year Avg |      |
|----------|-----|----------------|------|------|------|------|------|------|------|------|------|------|----------|------|
|          |     | Jan            | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  |          | Dec  |
| Moch Hoa | Avg | 76,8           | 77,0 | 76,3 | 76,5 | 82,0 | 84,6 | 85,0 | 84,6 | 83,8 | 82,4 | 79,2 | 76,7     | 80,4 |
|          | Min | 53,7           | 52,3 | 50,1 | 51,4 | 60,5 | 64,7 | 65,4 | 66,5 | 68,5 | 68,5 | 63,6 | 57,7     | 60,2 |

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

26. The rainy season starts which is from May to November accounts for 91.7 to 93.8% of the annual rainfall. The dry season starts from December to April with much lower rainfall (Table 6). As a consequence the river flow is minimal, water table lowers, and seawater intrusion through the rivers reaches maximum levels.

**Table 5. Average Monthly Rainfall at Tan An and Moc Hoa Stations 2009-2013 (mm)**

| Station | Mean Value by Month |      |      |      |       |       |       |       |       |       |     |     |
|---------|---------------------|------|------|------|-------|-------|-------|-------|-------|-------|-----|-----|
|         | Jan                 | Feb  | Mar  | Apr  | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov | Dec |
| Tan An  | 16.8                | 17.9 | 12.9 | 59.5 | 223.8 | 162.3 | 229.3 | 188.5 | 264.9 | 273.4 | 115 | 46  |
| Moc Hoa | 10.8                | 11.2 | 23.8 | 81.4 | 81.8  | 174.8 | 199.8 | 226.1 | 263.9 | 328.2 | 145 | 57  |

Source: Long An Statistical Yearbooks 2009-2013

27. In Duc Hoa District, water resources rely on rainfall and supply from Vam Co Dong River. The rainfall in rainy season accounts for 85% of annual precipitation. The water volume is abundant but unevenly distributed making excessive surface runoff and soil erosion in lowlands. (Table 7).

**Table 6. Duc Hoa annual rainfall distribution (mm)**

| Month                 | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Average rainfall (mm) | 16  | 7   | 18  | 82  | 225 | 277 | 259 | 205 | 318 | 353 | 148 | 62  | 1970  |

Source: Duc Hoa District Masterplan for Environmental Protection, 2011

**d. Wind velocity.**

28. During the rainy season the prevailing wind direction is south-west with the frequency of 70%, from May to November. Arriving from the sea the wind brings vapor and rain in the rainy season. In the dry season the prevailing wind direction is southeast with the frequency of 60-70% from December to April. In the rainy season, the average wind speed is greater than in the dry season, but the monthly difference is minimal. The average monthly wind speed is from 1.5 to 2.5 m/s; the highest wind speed monitored can reach approximately 30-40 m/s coming with the occurrence of thunderstorms, mostly in the rainy season with the west or southwest winds.

**Table 7. Average wind velocity in Long An province (m/s)**

| Month            | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| V <sub>avg</sub> | 1.8 | 2.6 | 2.8 | 2.2 | 1.7 | 2.3 | 2.3 | 2.6 | 1.8 | 2.1 | 2.2 | 1.7 | 2.2  |
| V <sub>max</sub> | 12  | 19  | 16  | 20  | 40  | 18  | 20  | 30  | 18  | 16  | 19  | 12  | 20   |

|                      |      |      |    |    |      |    |    |    |    |    |   |   |  |
|----------------------|------|------|----|----|------|----|----|----|----|----|---|---|--|
| Prevailing direction | SENE | SENE | SE | SE | W,SW | SW | SW | SW | SW | SW | N | N |  |
|----------------------|------|------|----|----|------|----|----|----|----|----|---|---|--|

Source: Long An Statistical Yearbooks 2009-2013

29. In Duc Hoa District thunderstorms occur 110 to 140 days from May to November. Thunderstorms can be dangerous if accompanied by thunder and lightning with wind speed approaching 30-40 m/s.

## 2. Air quality

30. Data available for ambient air quality in the whole area were retrieved from secondary sources, i.e. studies by Long An Department of Natural Resources and Environment and Ho Chi Minh City Institute of Environment and Natural Resources.<sup>4</sup> These studies concluded that the air environment in Long An is being degraded by industrial development and urban expansion. Most polluted areas are within and adjacent to existing industrial zones and the cities. Open landfills and large-scale animal farms that are not well managed are the major sources of air pollution in the rural areas of Long An Province.

31. However, air quality at the Duc Hoa substation site is good (Table 9). Results of the analysis verified that air quality (dust, SO<sub>2</sub>, NO<sub>2</sub> and CO) measured are within the limits set by QCVN 05: 2013 / BTNMT (Viet Nam National Standard on Ambient Air Quality). The noise level at the points of measurement is also much lower than limits in QCVN 26:2010/BTNMT (Viet Nam National Standard on Noise). This suggests the overall good quality of ambient air in the subproject area.

**Table 8. Air pollutants measured at the Duc Hoa Substation**

| Location                      | Temp. (°C) | Noise (dA) | Pollutant concentration (mg/m <sup>3</sup> ) |                 |                 |           |
|-------------------------------|------------|------------|--|-----------------|-----------------|-----------|
|                               |            |            | Dust   | SO <sub>2</sub> | NO <sub>2</sub> | CO        |
| K1                            | 31.2       | 58–60      | 0.142  | 0.012           | 0.032           | 20        |
| K2                            | 30.9       | 61–62      | 0.24   | 0.023           | 0.051           | 16        |
| <b>QCVN05:2013/<br/>BTNMT</b> | -          | ≤70        | <b>0.3</b>                                   | <b>0.35</b>     | <b>0.2</b>      | <b>30</b> |

**Sampling location**

**Coordinates**

K1 On access road at gate of the Substation

X=1122542

Y=665890

<sup>4</sup> Nguyen Van Phuoc et al 2011, Projecting environmental pollution generated by industrial development to the year 2020 in Long An Province, Journal of Science and Technology, vol.14, no.m1, 2011.

K2 Inside the existing Substation

X=1122489

Y=665811

Source: Duc Hoa Substation EIA prepared by PECC5, 2014

### 3. Topography, Geology and Soils

32. Duc Hoa district and Tan My Commune lie in Vam Co Dong River Basin which consists of various terraces and mudflats. This geomorphological zone is formed by aggressive-accumulative and accumulative processes. The foundational soils of fluvial, marine and fluvial-marine deposits are composed mainly of clay, silt and fine to medium grained sand. It has been assigned to late Pleistocene – late Holocene ( $Q_1^3$  and  $Q_2^3$ ).

33. According to the results of an investigation, done by PECC4 in July 2014, in conjunction with field work and laboratory analysis, soil in the subproject area is divided the 4 layers as presented as follows:

- **Topsoil layer:** soft to plastic, blackish grey clay
- **Layer 1 (CL):** plastic, brownish grey sandy clay with tree roots. Found at borehole G21.6 with thickness of 5.7m;
- **Layer 2 (CL):** Stiff to very stiff, yellowish, white, brownish grey sandy clay. Found at boreholes G21.5 and G21.7 with thickness from 5.1m to 11,6m;
- **Layer 3 (SC):** Stiff yellow sandy clay. Found at boreholes G21.6 and G21.7 with thickness from 5.0m to 5.5m.

34. Duc Hoa District possesses the transitional characteristics of being between the edge of the ancient alluvial dunes and plains along the Vam Co Dong River and alum swamps, lowering from northwest to southeast. Riparian lowland and alum swamps are fragmented by the density of natural rivers. Currently, the area is susceptible to flooding, storm surges and flooding rains in the rainy season. The PECC5 calculated the probability of flooding to Duc Hoa substation by high tides and floods in nearby Sai Gon River and Vam Co Dong River. It is concluded that the design of the substation can sustain the maximum level of flooding.

#### a. Soil

35. The following are the three major groups of soil in Duc Hoa District:

**Alum soil:** distributed along the Vam Co Dong River and Thai My Canal, accounting for 29% of the total land area of the district. The soil consists of loam and clay, with high toxic concentrations of  $Cl^-$ ,  $SO_4^{2-}$ ,  $Al_{3+}$ ,  $Fe_{3+}$ . This soil area is often flooded during the rainy season and suitable only for rice and sugarcane.

**Grey soil:** situated in the center of the district, along the provincial road 10, which extends from Loc Giang to Duc Hoa town; accounting for about 48% of the total land area of the district.

**Alluvial soil:** occupying of about 23% of the total land area of the district; composing of sand and loam. Most ancient alluvial land area suffers lack of water in the dry season.

#### 4. Surface and groundwater resources

36. Vam Co Dong River is the major river that runs along the boundary between the districts of Duc Hoa and Duc Hue. Originating from Cambodia it flows through TayNinh and Long An provinces of Viet Nam before entering into the sea via Soai Rap estuary. The section coming through Duc Hoa District is 40 km long and 17 m wide on average, with the riverbed slope of 0.21%. The canal system in the district is quite developed functioning as irrigation channels and inner waterways

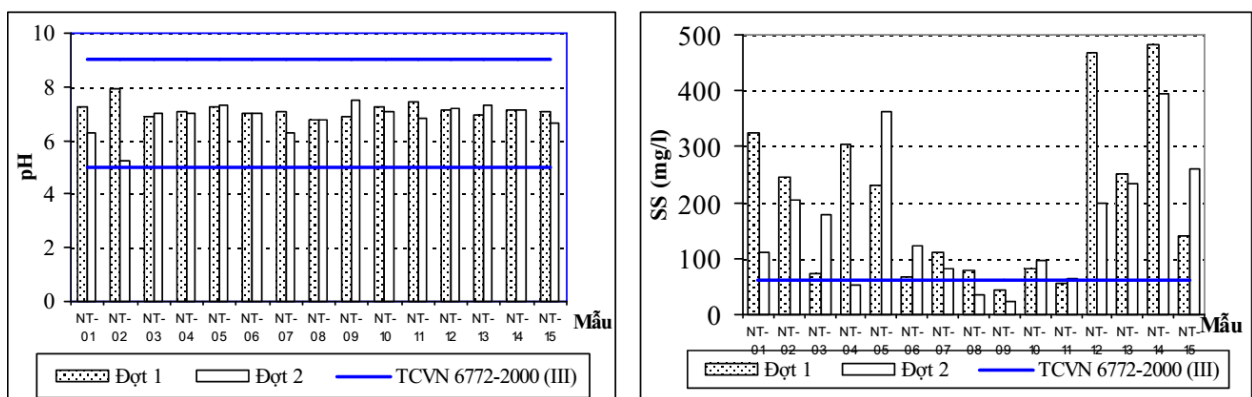
37. Duc Hoais affected by both upstream flooding from Mekong River and localized flooding in lowland usually from September to November. Flooding can last for continuous 20-30 days with high water level of +0.3-0.5m. The substation site is designed to be located on an elevated terrace and not prone to localized flooding.

38. Groundwater in Long An in general and Duc Hoa District in particular has not been comprehensively investigated. As of writing, such data for Duc Hoa are retrieved from a study by the Federation of Geology and Hydrology for Mekong Delta region and the results of the provincial rural water program prior to 2003. They showed that groundwater resources exploitable in the district lie in a depth range from less than 100m to 300m. Currently groundwater of less than 100 m depth is being exploited for domestic use.

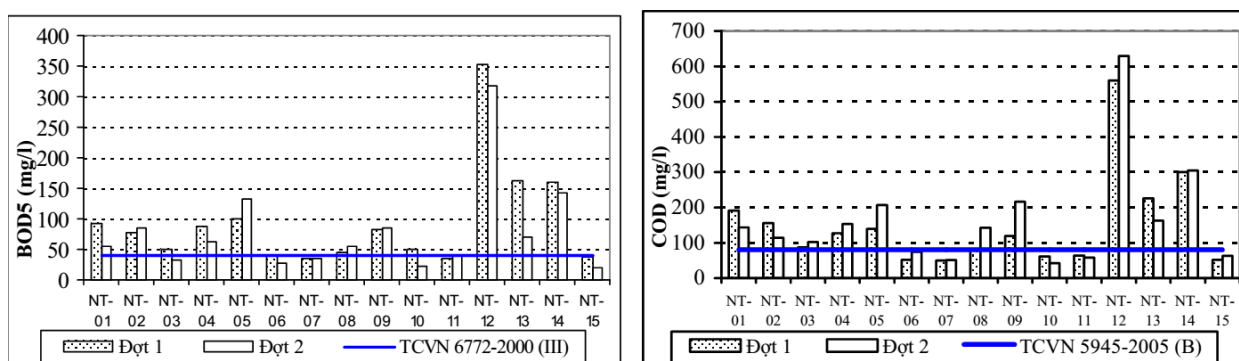
#### 5. Water quality

39. Recent official data on water quality for Long An Province and Duc Hoa District are unavailable. The state of water environment was determined with the 2011 EA report for Duc Hoa district supplemented with date collected by PECC4 in 2014 (Tables 3 and 4). The results of analysis asserted that most measured parameters exceed the allowable limits by Vietnamese standards for domestic wastewater. Some even are 7-8 times surpassing the limits such as SS, COD, BOD at given sampling points.

**Figure 3.pH and SS in urban wastewater in Duc Hoa Town**



**Figure 4. BOD and COD in urban wastewater in Duc Hoa Town**



Source: Duc Hoa District Master Plan for Environmental Protection to 2025, with vision to 2020

40. A recent survey of wastewater from the Duc Hoa substation was conducted in September 2014 (Table 10). The team sampled wastewater at the discharge gate to the irrigation canal in front of the substation. The analysis showed that most sampled parameters, except for COD, 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 9. Surface wastewater quality at Duc Hoa substation, 2014**

| No | Parameter                  | Unit   | Result | QCVN14:2008/BTNMT, Colum B |
|----|----------------------------|--------|--------|----------------------------|
| 1  | pH                         | -      | 6.6    | 5– 9                       |
| 2  | Total suspended solid(TSS) | mg/l   | 95     | 100                        |
| 3  | COD                        | mg/l   | 25     | 15                         |
| 4  | BOD <sub>5</sub>           | mg/l   | 13     | 50                         |
| 5  | Nitrate                    | mg/l   | 4.79   | 50                         |
| 6  | Phosphate                  | mg/l   | 0.39   | 10                         |
| 7  | Coliform                   | MPN/ml | 4.000  | 5.000                      |

Source: Duc Hoa EIA report, October 2014

## 6. Groundwater quality

41. As indicated above survey for Duc Hoa district in 2011 the major concern is about alum groundwater. It is found in many areas at particularly upper aquifers, where water is exploited to use for domestic purposes and irrigation. Though no data is present, it is likely that groundwater in the town is being affected by the pollution from dug and drilled wells that are not well managed, as seen in many other locations in Mekong River Delta.



42. The industrial facilities in main industrial zones use groundwater at depth > 200 m. For domestic use, local people have to drill wells a few dozen meters deep for clean water. But so far, the quality of water wells has not been investigated. According to the survey data, there are 50,000 wells in Duc Hoa District with a depth of 150-250 m. Many households extract 5-10 m<sup>3</sup>/day from 2-4 wells in the dry season to ensure adequate water supply

## 7. Electromagnetic field safety

43. Electromagnetic fields (EMF) were measured at Duc Hoa substation in Dec 2014. The data indicate that electromagnetic field intensity remains within the allowed level of safety for operators and people nearby (Table 11).

**Table 10. Measurement of electromagnetic field at Duc Hoa substation, 2014**

| No | Location<br>(Frequency 0-30kHz) | Safety Standard<br><5kV/m/8hrs |
|----|---------------------------------|--------------------------------|
| 1  | Office                          | 0.0046                         |
| 2  | Control box                     | 0.0035                         |
| 3  | Control panel                   | 0.042                          |
| 4  | At substation gate              | 0.15                           |
| 5  | At the transformer              | 0.22                           |
| 6  | 10m from the transformer        | 0.034                          |

Source: EIA report for 220 kV Duc Hoa substation, 2014.

## B. Biological Environment

### 1. Vegetation and Land Use

28. As of 2000 the forested area of Long An province covers 44.5 ha Melaleuca trees and eucalyptus are two main types of plants with a total volume of approximately 1.26 million m<sup>3</sup>. However, the plant and animal resources of the mangrove forest ecosystems in the alum lowlands in Long An has been exploited and devastated. Mangrove forests have been depleted steadily in the area due to development.

29. The forested area Duc Hoa District sharply decreased over the last ten years, from 597.4 ha in 2006 to 11.4 ha in 2015 (Table 12). The forest consists of mainly Melaleuca (cajuput) and eucalyptus trees planted in the eastern districts for rehabilitating alum lowlands. The quality of forest plantations is poor because limited protection and other growing land use purposes.

30. Land use in Duc Hoa district is summarized in Table 12. In Tan My Commune where the substation is sited, the vegetation is characterized by agricultural crops, mostly rice, sugarcane, peanut, corn and vegetables. There is no forest in the commune.

**Table 11. Duc Hoa District Land Use in 2015**

| Commune/Town  | Total land area (ha) | Wet rice (ha) | Perennial crops (ha) | Forest (ha) | Water bodies (ha) | Special use (ha) | Unused (ha) |
|---------------|----------------------|---------------|----------------------|-------------|-------------------|------------------|-------------|
|               | <b>23930</b>         | <b>8781</b>   | <b>6598</b>          | <b>11</b>   | <b>1218</b>       | <b>7063</b>      | <b>258</b>  |
| <b>Tan My</b> | <b>4753</b>          | <b>1378</b>   | <b>1806</b>          |             | <b>427</b>        | <b>1142</b>      |             |
| Tan Phu       | 4027                 | 1530.26       | 1248.37              |             | 362.43            | 885.94           |             |
| HauNghia Town | 989                  | 277           | 208                  |             | 20                | 484              |             |
| HoakhanhTay   | 2862                 | 315           | 1088                 |             |                   | 1202             | 258         |
| Hoakhanh Nam  | 1015                 | 386           | 213                  |             | 20                | 396              |             |
| Duc Hoa Town  | 733                  | 359           | 279                  |             | 29                | 66               |             |
| Duc HoaThuong | 3078                 | 1169          | 954                  |             | 277               | 678              |             |
| My Hanh Nam   | 3102                 | 558.36        | 651.42               |             | 62                | 1830.22          |             |
| Hoakhanh Dong | 1487.54              | 1328.26       | 57.75                | 0.4         | 17.22             | 83.91            | 0           |
| HuuThanh      | 1883.3               | 1480.22       | 93                   | 11          | 3.7               | 295.38           | 0           |

Source: Survey by Social Safeguard Team in 2015.

## 2. Wildlife

44. Wildlife in the area is sparse due to the long-term agricultural development, and limited forest habitat. Aquatic birds such as storks are found. There are no rare or extinct wildlife species in the area.

## 3. Conservation Areas

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

## C. Socioeconomic condition

### 1. Population

46. Duc Hoa district is relatively populous in the province. According to the statistics of 2012, the population of Duc Hoa district is 227,563 people with a density is 476 people/km<sup>2</sup>. The density of the province is 323people/km<sup>2</sup>). The population is distributed unevenly, often concentrated in the town, and along the main roads. The highest population is concentrated in the towns of Duc Hoa, HauNghia and HiepHoa. Almost all of Duc Hoa District areKinh people of 99% of the total; the other 1% belongs to Khmer, Cham, Chinese and Nung ethnic groups. There are no ethnic minorities in Tan My Commune,

## 2. Local Economy

47. In recent years Duc Hoa district has steadily become industrialized and urbanized (Table 13). A 2010 statistics shows the strong proportion of the industry sector in local GDP, almost 69% compared to 17% for agriculture and 14% for services and trade. Five industrial parks and 14 industrial clusters with over 1,500 companies are operating, of which is the largest industrial parks in the Province. 35 thousand workers are employed. The district poverty incidence is as low as 3.3% in 2014 (Table 14).

**Table 12.Industrial zones in Duc Hoadistrict**

| <b>Industrial zone</b> | <b>Area (ha)</b> |
|------------------------|------------------|
| Duc Hoa 1 – HanhPhuc   | 274.33           |
| Duc Hoa 2 – Xuyen A    | 483.13           |
| Duc Hoa 3              | 2300             |
| Tan Duc                | 569              |
| Duc Hoa Dong           | 500              |

48. The farming sector in Tan My Commune aligns in parallel with that of Duc Hoa District in a descending trend. The dominant farming crops are wet rice, bean, corn and vegetables. Due to its low productivity and income, a large number of farmers seek work in other sectors. As of April 2015, only 20.9% of HH work in farm and 79.1% in commerce and services in 159 self-run shops.

**Table 13.Income and poverty in Duc Hoadistrict, 2014**

| <b>No</b> | <b>Commune/Town</b> | <b>No.hhs</b> | <b>Monthly income (VND)</b> | <b>No.poorhhs</b> |
|-----------|---------------------|---------------|-----------------------------|-------------------|
| 1         | Tan My              | 2691          | 4,200,000                   | 403               |
| 2         | Tan Phu             | 2451          | 3,060,000                   | 123               |
| 3         | HauNghia Town       | 1851          | 4,350,000                   | 37                |
| 4         | HoakhanhTay         | 2344          | 4,500,000                   | 117               |
| 5         | Hoakhanh Nam        | 1551          | 4,150,000                   | 31                |
| 6         | Duc Hoa Town        | 2487          | 2,500,000                   | 373               |
| 7         | Duc HoaThuong       | 2514          | 3,100,000                   | 126               |
| 8         | My Hanh Nam         | 3151          | 4,800,000                   | 63                |

|    |               |              |           |            |
|----|---------------|--------------|-----------|------------|
| 9  | HoaKhanh Dong | 2811         | 2,150,000 | 27         |
| 10 | HuuThanh      | 2757         | 2,400,000 | 45         |
|    | <b>Total</b>  | <b>24608</b> |           | <b>819</b> |

Source: Survey by Social Safeguard Team in 2015.

49. The local handicraft industry and trades in Duc Hoa district remains stagnant and rather of low value. These activities are diverse involving bamboo basket weaving, bamboo screen production, palm-leaf conical hat production, fish sauce processing, rice milling, farm product processing etc. Although small-sized and disperse, the industry helps generate jobs and income for farmers in offseason periods. On average, a household can employ 2-3 workers and a production unit creates jobs for 20-25 people.

### **3. Social Infrastructure**

#### **a. Public Health and Sanitation.**

50. Currently, Duc Hoa District has 01 district level general hospital in the town of HauNghia with 235 beds and medical staff of 278 people. This improves the quality of health care for local people. There are also 10 communal clinics and 3 regional polyclinics. In the whole province, 16 hospitals located in different districts and urban areas provide people better access to healthcare services.

51. According to data from the MOLISA's Department for Social Vices Prevention, in Long An province, by 2014, 4,167 HIV-infected patients are detected, 2,421 patients with AIDS, and 1,320 deaths. The number of HIV/AIDS patients with records is 1501, in which 1,351 patients who live at home and 150 patients are treated in 4 HIV/AIDS treatment clinics in the province. There are 185 out of 192 communes, wards and towns with infected patients, equivalent to infection rate of 96.4%.

52. Ninety five percent of communal households have sanitary toilets and 83% have access to clean water (2557 households). Domestic and industrial waste remains problematic to local authority with regard to waste collection, transportation and disposal. Currently there is no landfill for the district. All wastes collected in the urban and industrial zones are handled by the District Civil Works Company who then transports to the PhuocHiep-Cu Chi landfill in Ho Chi Minh City. According to Long An Provincial Master Plan for Waste Treatment Sites in 2010-2020 with vision to 2030, a waste treatment facility will be built in Duc Hoa Dong Commune for the whole Duc Hoa district but no details on construction date are given.

53. Drainage system in urban areas, e.g. Duc Hoa Town and HauNghia town, has been established but far from completed. The domestic wastewater is discharged to surrounding ditches and irrigation canals without treatment. Animal excreta from large-scale farms and aquaculture activities such as caged fish raising are also polluting local surface water.

#### **b. Education**

54. The education system in Long An province in general and Duc Hoa district in particular covers pre-schooling to tertiary level. At provincial level, there are 422 schools

from elementary to high school; 2 universities and 6 technical and vocational colleges. There are 31 educational organizations present in Duc Hoa district composed of 10 kindergartens, 11 elementary schools, 9 secondary schools and 1 high school. One hundred percent of children of schooling age have received universal education.

**c. Communications:**

55. The subproject area is being covered by many telephone networks such as Viettel 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:**

56. The subproject area is supplied with 11 concentrated water schemes which cover 83% of the district's households (Table 15). Main water source came from underground water from upper aquifers. There are about 50,000 wells with depths ranging from 150-250m. As of 2015, 100% of commune households have access to electricity.

**Table 14. Water supply in Duc Hoa District, 2015.**

| No | Commune/Town  | Total HHs | Tapwater | Drilled well | Dug well | Rivers, ponds, streams |
|----|---------------|-----------|----------|--------------|----------|------------------------|
| 1  | Tan My        | 2691      | 2557     | 81           |          | 53                     |
| 2  | Tan Phu       | 2451      | 2156     | 221          |          | 74                     |
| 3  | HauNghia Town | 1851      | 1795     |              | 37       | 19                     |
| 4  | HoaKhanhTay   | 2344      | 2227     | 70           |          | 47                     |
| 5  | HoaKhanh Nam  | 1551      | 1504     |              | 31       | 16                     |
| 6  | Duc Hoa Town  | 2487      | 2350     | 94           |          | 43                     |
| 7  | Duc HoaThuong | 2514      | 2389     |              | 50       | 75                     |
| 8  | My Hanh Nam   | 3151      | 3056     |              | 63       | 32                     |
| 9  | HoaKhanh Dong | 2811      | 1176     | 963          | 672      |                        |
| 10 | HuuThanh      | 2757      | 1369     | 1253         | 135      |                        |

Source: Survey by Social Safeguard Team in 2015.

**4. Infrastructure for transportation**

57. The system of transportation in Duc Hoa district is well developed and connected, with provincial highways no. 822, 823, 824, 825 as the main traffic routes connecting with Highway 1A and Trans-Asian Highway. The N2 route links the district with Ho Chi Minh City and other Mekong Delta Provinces. The inter-district main roads among urban communes and districts have been asphalted or concreted while the smaller rural roads are paved with gravels and small rocks for better travel.

## 5. Cultural and Heritage Sites

58. In Duc Hoa there are 5 cultural and historical sites that are recognized at national and provincial level. They include Binh Ta archeological site, Go Don relics, Go Xoai relics, Go Nam Tuoc relics and Duc Hoa Junction historical site. Of which four sites are related to Hindu cultural and religious traditions established from 1 – 630 A.D as OcEo Culture in the ancient Funan Kingdom.

59. The IEE with PECC5 investigated all possible sensitive receptors in a range of 5km from the Duc Hoa substation (Table 16). It is found that no such sites are within 500m of the substation, therefore no impacts from the subproject are incurred. The table below presents all environmental sensitive receptors around the concerned site.

**Table 15. Environmental Sensitive Receptors around the Substation**

| Substation                               | Name of receptors                  | Distance from substation (km) |
|--|------------------------------------|-------------------------------|
| 220kV Duc Hoa substation, Tan My Commune | Bau Cong Church                    | 4                             |
|  | Lap Dien Church                    | 6                             |
|  | Rung Mui Temple                    | 5                             |
|  | Communal People's Committee Office | 10                            |
|  | Primary school                     | 5                             |
|  | Secondary school                   | 10                            |
|  | Kindergarten                       | 5                             |
|  | Communal clinic                    | 10                            |

Source: IEE consultant and PECC5 team, April 2015

## 6. UXO Clearance

60. After decades of war UXO remains a significant issue in Viet Nam. However, the risk of UXO accidents is zero since clearing of UXO has been conducted before the construction of the Duc Hoa substation since 2010. The ground within the boundary of the substation for the construction of the 2<sup>nd</sup> transformer has been prepared; therefore additional UXO clearance is not necessary.

## 7. Subproject affected people

61. No people will be affected by the installation of the 2<sup>nd</sup> transformer and related construction activities in the substation.

## D. Additional features of 220 kV Duc Hoa substation

31. The site of the substation and the site where the new transformer will be installed are presented in Figure 5.

**Figure 5. Features of 220 kV Duc Hoa substation site**



Fig 5a:  
Access road to  
the substation



Fig 5b:  
The 1<sup>st</sup>  
transformer  
installed



Fig 5c:  
Location inside  
substation for  
2<sup>nd</sup> substation



Fig 5d:  
Cajuput woods  
adjoining the  
substation site





Fig 5e:  
Land owned  
by Hong Phat  
Company  
adjacent to  
220 kV Duc  
Hoa substation

## V. INFORMATION DISCLOSURE AND PUBLIC CONSULTATION

### A. Information disclosure

62. Formal disclosure to affected persons and stakeholders of information on the 220 kV Duc Hoa substation that occurred during the IEE is meant to form the beginning of continued information disclosure and stakeholder involvement as the subproject is implemented. As part of the stakeholder communication strategy regular information exchange, and meetings with stakeholders are strongly encouraged throughout implementation of the subproject.

63. The IEE must be easily available to the stakeholders contacted during examination in written and verbal forms in local language of Vietnamese. At the minimum the Executive Summary of the IEE should be translated to local language and distributed to all APs. The IEE should be available on the 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 should be available at the same offices and websites. The IEE will be available on the ADB website as well as EMP reporting that is prepared by the EA/IA after implementation begins.

### B. Public Consultation

64. Stakeholder consultations were developed to meet the requirements of meaningful consultation as stipulated by the SPS (2009). 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**

65. 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) PECC4, and (v) commune leaders.

## **2. Public consultation meeting**

66. A written consultation with local People's Committee and Commission was previously held by the Vietnamese EIA team (PECC4) in 28 July 2014. A follow up direct community consultation meeting was held by the IEE consultant to discuss the location and impact of the substation for both environmental and social aspects. The meeting is convened in Tan My Commune, Duc Hoa District of Long An Province on 20<sup>th</sup> of April 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 policy, safety regulations in the Viet Nam power sector, anticipated environmental impacts and respective mitigation measures (to be developed in IEE), the grievance redress mechanism for environmental and resettlement problems.

67. During the meeting people raised their questions and comments on the environmental issues. The PECC5 consultant and IEE national consultant answered and explained 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. These impacts are presented in the following table.

68. The participants of the public consultation meeting included Commune leaders, representatives of mass organization such as Women Union and affected people. The total number of people consulted was 15 (Appendix B).

### **3. Results of Public consultations**

69. Comments from communal authorities are collected by PECC5 consultation in writing. 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 should ensure all mitigation measures during the construction phase are implemented, especially to avoid disturbances to environmental and social life and to rehabilitate roads if harmed.
- The Operator of the substation should strictly follow regulations during the upgrading and operation of the substation.

9. The summary of comments/questions from local authorities/people and answers of consultants are summarized in Table 17. Subsequent formal consultations are not required by an IEE. However, required input from stakeholders and response from project owners will occur through the Grievance Redress Mechanism (see below).

**Table 16. Summary of concerns and issues with subproject**

| Location and time  | Comments/questions local people   | Answers of consultants  | Project Response  |
|--|---|---|---|
| Tan My Commune, Duc Hoa District, Long An Province<br><br>April 20, 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 requirements for establishing construction schedules during the pre-construction stage                                     |
|  | Wastewater discharge from the existing substation floods surrounding rice fields and damages the productivity.  | Though the issue is not directly related to proposed component of the project, it is highly appropriate for further investigation for the future operation of the substation.<br><br>If these concerns are founded the local people are encouraged to file their complaint to the local authority. <sup>5</sup> | While peripheral the EMP does prescribe wastewater and drainage management requirements associated with the operation of the new transformer. |
|  | Waste from construction activities must be cleaned  | The Project Owner will ensure that the constructor strictly follow EMP which provide details of waste management at site.   | The EMP prescribes specific mitigation sub-plans construction waste management  |
|  | Restore the access road after completing construction   | The Project Owner will ensure that the constructor will repair and restore the access road for normal traffic as good as pre –construction period.  | The existing dirt access road is wide and used by other large trucks. Any damage caused by subproject will be repaired                        |
| <b>Conclusion</b>  | Tan My Commune People’s Committee (CPC) and local people agree with the installation of the 2 <sup>nd</sup> transformer in the 220 kV Duc Hoa substation. Impacts from the current operation of the substation on local people should be handled in due time.<br><br>Project Owner and the Contractor will implement the EMP to minimize potential adverse impacts of the proposed subproject |   |   |

<sup>5</sup> A field visit to the substation site was made immediately by the IEE consultant and the locals following the consultation meeting. The construction of the drainage ditch around the substation exposed acidic alum soil that contaminated the surrounding rice fields. Though the rice field area is very small and far from the substation and the impact on productivity would be subsequently insignificant the IEE consultant recommends the Project Owner to concretize the ditch to avoid this contamination in the 2<sup>nd</sup> phase of the subproject.

## VI. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

70. 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 environmental management plan for the subproject (see section IX).

### A. Subproject Benefits

71. The single comprehensive benefit of the subproject is the provision of needed additional electrical power to Duc Hoa district and throughout Long An while reducing power outages or brownouts.

### B. Pre-construction Phase

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

73. The subproject EMP will be reviewed during the pre-construction phase 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 busy access road; and
- Updating and initiation of the brief subproject EMP.

### C. Construction Phase

74. The potential environmental impacts of the new transformer are restricted to: 1) use of the busy access road for transformer equipment delivery, and risk of increased traffic accidents and dust and noise production; and, potential worker accidents during transformer installation.

### Mitigation measures

75. Construction management measures to mitigate the potential the above common 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 should be employed at substation site, and along the busy access road.
- All equipment delivery and construction vehicles, and gas powered equipment should be maintained in proper working order to minimize emissions, and not operated at night if possible to minimize noise.
- Speed limits should be posted and adhered to by construction vehicles.
- Local workers should 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 appropriate GoV regulations on Occupational, Safety, and Community Health must be applied<sup>6</sup>, or the IFC/World Bank Environment, Health, and Safety Guidelines (2007) for Power Distribution that govern the safe and orderly operation of civil works should be followed.
- Aggregates (e.g., sand, gravel, rock) that are transported by truck should be covered.
- Prolonged use of temporary storage piles of fill should be avoided, or covered, or wetted regularly to prevent dust and erosion.
- Storage of bulk fuel should 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 should be required to have an emergency plan to handle fuel and oil spillage

#### **D. Operation Phase**

76. The potential impacts of the operational transformer are restricted to worker safety, and possible spills of hazardous waste such as transformer oils. These potential impacts are addressed by existing worker safety directives and guidelines of M/DoLISA, and operation regulations for substations (e.g., Table 1, Section II).

#### **E. Climate Change**

77. There have been numerous recent reports and summaries, e.g.,<sup>7, 8, 9</sup>, of climate change scenarios for Viet Nam based on the most recent climate change projections of the different Global Circulation Models (GCM). The fact sheet for Viet Nam<sup>10</sup> compiled by the MONRE of Viet Nam summarizes projected climate change for Viet Nam as follows.

78. By 2100 average annual air temperature in the country is expected to increase by 2.3 C° with the frequency of heat waves increasing by 100-180%, and cold surges decreasing by 20-40%. Total rainfall, and extreme rainfall events is 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<sup>11</sup>**

79. The sensitivity of the 220 kV Duc Hoa substation subproject to climate change is considered low as determined by the initial rapid environmental assessment of the subproject (Appendix A). The substation 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.

<sup>6</sup> e.g. Circular No: 22/2010/TT-BXD, date issued: 03<sup>rd</sup> December 2010.

<sup>7</sup> ADB (2013). Viet Nam and Climate Change Assessment and Impacts, 31 pgs + Appendices

<sup>8</sup> MONRE, 2009. Climate Change and Sea Level Rise Scenarios, 15 pgs + Appendices

<sup>9</sup> 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

<sup>10</sup> MONRE 2010, Climate Change Fact Sheet for Viet Nam

<sup>11</sup> sensu, ADB (2014) Climate Proofing ADB Investment in the Transport Sector: Initial Experience, 88 pgs + Appendices

## **2. Contribution to Global Climate Change**

80. 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**

81. No alternative subproject designs or locations were available for the IEE.

## **VIII. PUBLIC GRIEVANCE REDRESS MECHANISM**

### **A. Type of Grievances**

82. Any affected person (AP) can submit a grievance with SPPMB or PTC4 if they believe a practice is having a detrimental impact on the community, the environment, or on their quality of life. 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 affected person(s).

### **B. Grievance Redress Mechanism**

83. A subproject grievance can be defined as an actual or perceived subproject-related problem that gives ground for complaint by an affected person (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 grievance redress mechanism (GRM) will be developed in accordance with ADB requirements and Government procedures.

84. 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.

85. For complaints received about the construction works, the SPPMB will involve the Contractor. When these are not resolved, any complaint is then facilitated by the SPPMB through the Environment and Social Unit (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.

86. The following are the steps for the GRM (Figure 6):

**Step 1:** For complaints occurring during the construction phase, affected persons 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 Contractor 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 the SPPMB through the monthly progress report.

**Step 2:** If the complainant is not satisfied with the action(s) undertaken by the Contractor, the affected person 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, the SPPMB monitors the resolution of the complaint. The Contractor shall be required to report any action to the 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 affected person 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**

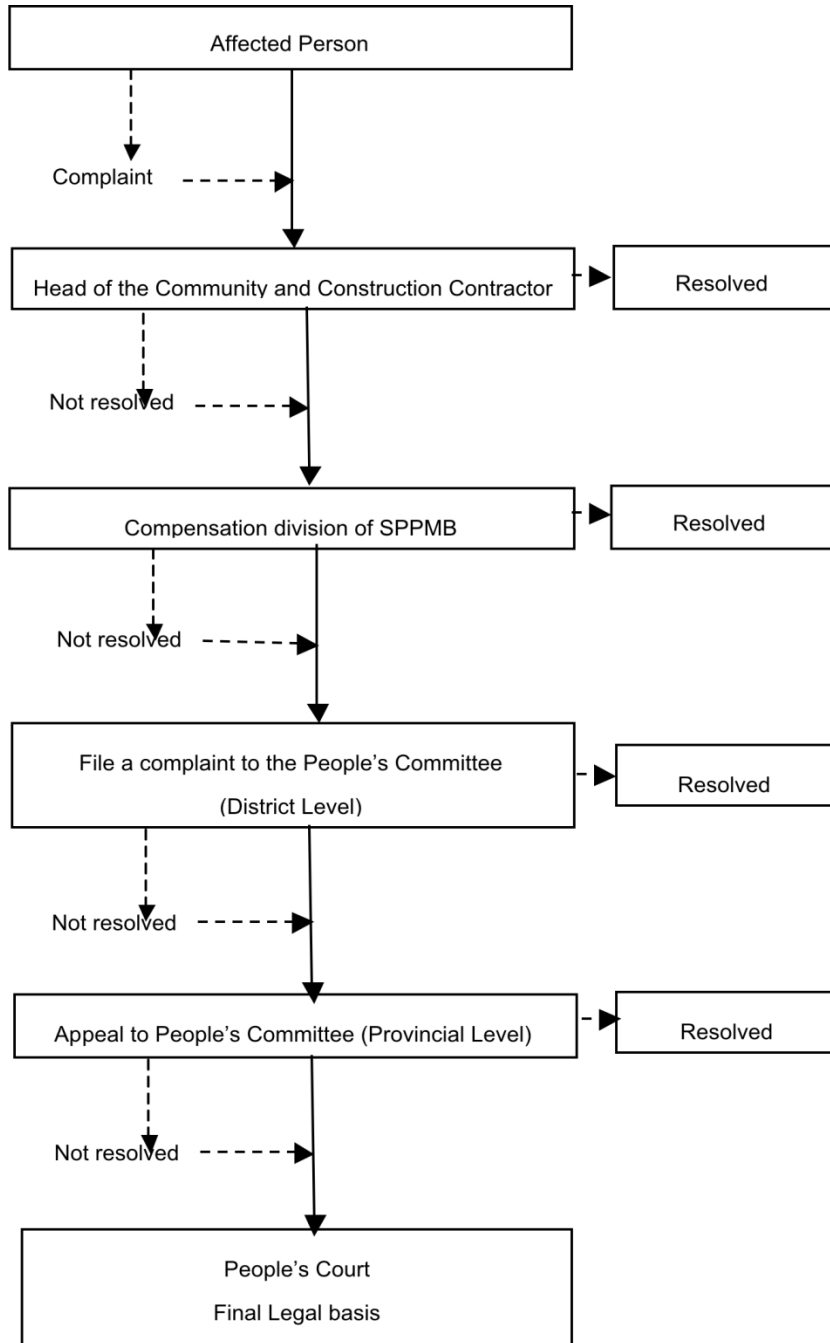
87. Under the regulations in Viet Nam, APs having complaints or grievances will not be responsible for paying any administrative and legal fees in filing their complaints. Any site clearing is not allowed while the resolution of the complaint is still pending.

88. 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.

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



**Figure 6. The Grievance Redress Mechanism**



## IX. ENVIRONMENTAL MANAGEMENT PLAN

90. A brief environmental management plan (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 Emergency Response Plan, and the institutional responsibilities for the EMP.

### A. Institutional Arrangements and Responsibilities

91. At the feasibility stage the primary management framework responsible for the implementation of the EMP for the new transformer at the 220 kV Duc Hoa substation is summarized as follows. The National Power Transmission Corporation (NPT) is the executing agency (EA). The EA takes overall responsibility for implementing the EMP with executive support from the Southern Viet Nam Power Project Management Board (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 environmental and social unit (ESU) whose sole responsibility is to implement the EMP.

92. The ESU oversees and assists the work of the environmental officer (EO) of the construction Contractor who implements the EMP with the CEMP<sup>12</sup>. 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 Power Transmission Company 3 or 4. A summary of indicative responsibilities for implementation of the EMP is provided below.

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

1. Overall responsibility for implementation of 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.

94. The responsibilities of the IA/ESU include:

5. Notify DONRE to verify GoV 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

---

<sup>12</sup> Contractor Environmental Management Plan prepared by Contractor from EMP which is part of bid documents.

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;
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.

The responsibilities of Environmental Officer (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 any environmental issues at construction sites.

95. The Department of Natural Resources and Environment (DONRE) is the provincial agency which oversees environmental management of Long An province. The DONRE with District staff provides direction and support for environmental protection-related matters including application of the Law on Environmental Protection (2014), EIA, and environmental standards.

96. The ADB provides guidance to EA/IA with any issues related to EMP, and reviews biannual reports on EMP activities compiled and submitted by EA.

## B. Summary of Potential Impacts of Subproject

The potential impacts of the subproject are summarized in Table 18.

**Table 17. Summary of potential impacts of subproject**

|  |
|--|
| <b>Pre-construction Phase</b>  |
| <ul style="list-style-type: none"> <li>• None</li> </ul>   |
| <b>Construction Phase</b>  |
| <ul style="list-style-type: none"> <li>• 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,</li> </ul> |
| <b>Operational Phase</b>   |
| <ul style="list-style-type: none"> <li>• Risk of worker accidents associated with new transformer</li> <li>• Potential spills of hazardous materials such as transformer oil</li> </ul>  |

### **C. Impact Mitigation Plan**

97. The brief impact mitigation measures of the EMP are presented for the three phases of subproject implementation (pre-construction, construction, operation) in Table 19.

**Table 18. Impact Mitigation Plan**

| Subproject Activity  | Potential Environmental Impacts   | Proposed Mitigation Measures  | Location                             | Timing                        | Activity Reporting | Estimated Cost <sup>13</sup> (USD) | Responsibility |                |
|--|-----------------------------------|---|--------------------------------------|-------------------------------|--------------------|------------------------------------|----------------|----------------|
|  |                                   |   |                                      |                               |                    |                                    | Supervision    | Implementation |
| <b>Pre-construction Phase</b>                                      |                                   |   |                                      |                               |                    |                                    |                |                |
| 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 <sup>14</sup>     | 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<br>3. Initiate Grievance Redress Mechanism   | 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            |

<sup>13</sup> Costs will need to be updated during detailed design phase.

<sup>14</sup>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 <sup>13</sup> (USD) | Responsibility |                |
|---|--|--|-------------------------------|---------------------------|--------------------|------------------------------------|----------------|----------------|
|   |  |  |                               |                           |                    |                                    | Supervision    | Implementation |
| <b>Construction Phase<br/>Installation of Transformer</b> |  |  |                               |                           |                    |                                    |                |                |
| 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.<br>3. Cover or keep moist all stockpiles of construction aggregates, and all truck-loads of aggregates.<br>4. As much as possible, restrict working time at substation site between 07:00 and 17:00.<br>5. Maintain equipment in proper working order<br>6. Replace unnecessarily noisy vehicles and machinery.<br>7. Vehicles and machinery to be turned off when not in use.<br>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. .<br>10. Post speed limits, and create dedicated construction vehicle roads or lanes.  | Access road                   | Fulltime                  | Monthly            | No marginal cost                   | IA/ESU         | contractor     |

| Subproject Activity                         | Potential Environmental Impacts      | Proposed Mitigation Measures   | Location                | Timing   | Activity Reporting | Estimated Cost <sup>13</sup> (USD) | Responsibility |                |
|---|--------------------------------------|--|-------------------------|----------|--------------------|------------------------------------|----------------|----------------|
|   |                                      |  |                         |          |                    |                                    | Supervision    | Implementation |
|   |                                      | <p>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.</p> <p>12. Demarcate additional locations where pedestrians can develop road crossings away from construction areas.</p> <p>13. Increase road and walkway lighting where necessary for safety.</p>  |                         |          |                    |                                    |                |                |
| Implement worker and public safety sub-plan | Public and worker injury, and health | <p>14. Worker and public safety guidelines of MOLISA should be followed.</p> <p>15. Speed limits suitable for the size and type of construction vehicles, and current traffic patterns should be developed, posted, and enforced on all roads used by construction vehicles.</p> <p>16. Appropriate safety clothing and footwear should be mandatory for all construction workers.</p> <p>17. Adequate medical services must be on site or nearby all construction sites.</p> <p>18. Drinking water must be provided at all construction sites.</p> <p>19. Sufficient lighting to be used during necessary night work.</p> <p>20. All construction sites should be examined daily to ensure unsafe conditions are removed.</p> | Substation, access road | Fulltime | Monthly            | No marginal cost                   | IA/ESU         | contractor     |

| Subproject Activity         | Potential Environmental Impacts           | Proposed Mitigation Measures  | Location      | Timing   | Activity Reporting | Estimated Cost <sup>13</sup> (USD) | Responsibility |                |
|-----------------------------|---|---|---------------|----------|--------------------|------------------------------------|----------------|----------------|
|                             |   |   |               |          |                    |                                    | Supervision    | Implementation |
| <b>Operational Phase</b>    |   |   |               |          |                    |                                    |                |                |
| Operation of new substation | Increased risk of worker or public injury | 1. Occupational health and safety regulations and guidelines of MOLISA should be applied to operations of substation. | At substation | Fulltime | Biannual           | O and M                            | PTC4           |                |



## **D. Monitoring Plan**

98. The brief environmental monitoring plan for the three phases of subproject implementation is provided in Table 20 which consists of environmental indicators, the sampling locations and frequency, method of data collection, responsible parties, and estimated costs.

99. 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 should be followed to supplement standards that are not provided by the GoV.

## **Performance Monitoring**

100. 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 21.

## **E. Reporting**

101. Regular reporting on the implementation of mitigation measures, and on monitoring activities during construction phase of the subproject is required. Reporting is the responsibility of IA/ESU and should be conducted in conjunction with regular meetings with stakeholders as part of the continuation of stakeholder communications. The mitigation and monitoring plans (Tables 19-20) summarize proposed timing of reporting.

102. 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 and ADB. The reports will table all indicators measured with the monitoring plan of EMP including performance monitoring indicators (Table 21), and will include relevant GoV environmental quality standards. A semi-annual report on the environment monitoring of the subproject must be prepared and submitted to the ADB by the EA for disclosure on ADB website pursuant to ADB Public Communication Policy (2011).

**Table 19. Environmental monitoring plan for the 220 kV Duc Hoa substation**

| ENVIRONMENTAL EFFECTS MONITORING   |  |   |   |   |                        |                |  |
|--|--|---|---|---|------------------------|----------------|--|
| Environmental Indicators   | Location   | Means of Monitoring   | Frequency                                 | Reporting   | Responsibility         |                | Estimated Cost (USD)                           |
|  |  |   |   |   | Supervision            | Implementation |  |
| <i>Pre-construction Phase – Review Baseline Conditions</i>                       |  |   |   |   |                        |                |  |
| Qualitative air quality: dust, noise   | At substation and along access road                  | Using field and analytical methods approved by DONRE.                                   | A) One day and one night measurement      | One baseline supplement report before construction phase starts | IA/ESU                 | ESU            | \$1,000.                                       |
| <b>Construction – installation of new transformer into Duc Hoa substation</b>    |  |   |   |   |                        |                |  |
| A) Qualitative air quality: dust, noise  | A) Baseline sites of pre-construction phase.         | A – B : Using field and analytical methods approved by DONRE., & visual observation     | A): Quarterly during construction periods | Monthly   | A - C:                 |                | A and B:<br>\$1,000./yr<br>C: no marginal cost |
| B) Domestic (worker) and construction solid waste inside and outside substation. | B) All construction sites and worker camps           | C Information transferred by telephone hotline number posted at all construction sites. | Daily visual records                      |   | IA/ESU                 |                |  |
| C) Public comments and complaints  | C) Using hotline number placed at construction areas | D) regular reporting by contractors/ESU   | B) Monthly                                |   | D) daily observations: |                | D: no marginal cost                            |
| D) Incidence of worker or public accident or injury                              | D) At all construction areas                         |   | C) Continuous public input                |   | IA/ESU                 | contractor     |  |
|  |  |   | D) Continuous                             |   |                        |                |  |

| <b>ENVIRONMENTAL EFFECTS MONITORING</b>                         |   |                                     |                  |                  |                       |                       |                             |
|---|---|-------------------------------------|------------------|------------------|-----------------------|-----------------------|-----------------------------|
| <b>Environmental Indicators</b>                                 | <b>Location</b>                         | <b>Means of Monitoring</b>          | <b>Frequency</b> | <b>Reporting</b> | <b>Responsibility</b> |                       | <b>Estimated Cost (USD)</b> |
|   |   |                                     |                  |                  | <b>Supervision</b>    | <b>Implementation</b> |                             |
| <b>Operation of new transformer in Duc Hoa substation</b>       |   |                                     |                  |                  |                       |                       |                             |
| Incidence of worker accidents, or spills on hazardous materials | At substation and along connector lines | Regular documentation and reporting | Continuous       | Quarterly        | PTC4                  | O and M               |                             |

**Table 20. Performance monitoring indicators for Duc Hoa subproject**

| <b>Environmental Component</b>                | <b>Key Indicator</b>                          | <b>Performance Objective</b>   | <b>Data Source</b>                            |
|---|---|--|---|
| <b><i>Pre-construction Phase</i></b>          |   |  |   |
| 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 grievance mechanism | 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 <sup>15</sup> )     | 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 |
| <b><i>Construction Phase</i></b>              |   |  |   |
| 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 GoV occupational health and Safety regulations <sup>16</sup>  | Contractor reports                            |
| Traffic                                       | Frequency of disruptions and blocked roadways | Disruptions, stoppages, or detours are managed to absolute minimum.  | Public input, contractor reports,             |
| <b><i>Operation of Duc Hoa substation</i></b> |   |  |   |
| Worker and Public Safety                      | Frequency of accidents and spills             | No increase in pre-construction frequency  | PTC4  |

#### **F. Estimated Cost of EMP**

103. 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 \$8,000.00 which is summarized in Table 22. The environmental costs in Table 22 are primarily for field sampling which include professional per diem of technicians.

<sup>15</sup> Contractor Environmental Management Plan developed from EMP in contractor bidding document

<sup>16</sup> OSH Guidelines provided by MOLISA, or IFC World Bank EHS (2007) for Electric Power Transmission & Distribution

**Table 21. Estimated costs for Environmental Monitoring Plan of EMP**

| <b>Activity Type</b>                                  | <b>Estimated Cost (USD)</b> |
|---|-----------------------------|
| <i>Pre-construction Phase</i>                         |                             |
| Updating Environmental Baseline                       |                             |
| cultural receptors                                    | no cost                     |
| environmental quality                                 | \$1,000.00                  |
| <i>Construction Phase</i>                             |                             |
| environmental quality                                 | \$2,000.00                  |
| public consultation                                   | no cost                     |
| <i>Operation Phase</i>                                |                             |
| environmental quality                                 | no cost                     |
| public input  | no cost                     |
| Training and capacity development of NPT / PPBM / ESU | \$5,000.00                  |
| <b>Total</b>  | <b>\$8,000.00</b>           |

104. 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**

105. The Contractor must develop emergency or incident response procedures during construction and operation phases of the new 220 kV Duc Hoa substation and connector lines to protect workers and the public. The emergency response plan (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**

106. 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 should be included with costs for implementation of the EMP.

107. Training on the implementation of an EMP should address two thematic areas. The first area should be principles environmental assessment and management focused on the potential

impacts of subproject activities on the natural and social environments. The second area should be environmental safeguard requirements of the ADB and GoV with specific reference to the EMP.

## **XII. CONCLUSIONS AND RECOMMENDATION**

108. The initial examination of the Second transformer bank for 220 kV Duc Hoa substation in Bau Cong Hamlet, Tan My commune indicates that potential environmental impacts are construction-related impacts and disturbances that can be mitigated and managed.

109. 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).

110. 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 environmental impact assessment (EIA) of the subproject is not required.

## **XIII. REFERENCES CITED**

ADB, 2003, Environmental Assessment Guidelines of the Asian Development Bank.

ADB, 2009. Safeguard Policy Statement, ADB Policy Paper.

ADB, 2012, Environmental Safeguards, A Good Practice Sourcebook, Draft.

Duc Hoa District 2012, Statistical Yearbook.

Duc Hoa District 2011, Environmental Masterplan to 2015 with Vision to 2020.

Ministry of Construction, 2009. Viet Nam building Code 02:2009/BXD

PECC5, 2014. 220 kV Duc Hoa Environmental Impact Assessment Report.

Social Safeguard Team 2015, SIA data collected for Duc Hoa Substation.

Long An 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 Duc Hoa

Sector / Division:

Energy / SEEN

| Screening Questions   | Yes | No | Remarks |
|---|-----|----|---------|
| <b>A. PROJECT SITING</b>  |     |    |         |
| 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>B. POTENTIAL ENVIRONMENTAL IMPACTS</b>   |     |    |         |
| 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  |
|---|-----|----|--|
| <ul style="list-style-type: none"> <li>community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?</li> </ul>   |     | 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. |
| <ul style="list-style-type: none"> <li>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?</li> </ul>  |     | X  |  |
| <ul style="list-style-type: none"> <li>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?</li> </ul> | 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 Duc Hoa substation

**Sector:** Power Transmission

**Subsector:** Transmission

**Division/Department:** SEEN / SERD

| Screening Questions  | Score | Remarks |
|--|-------|---------|
| <b>Location and Design of project</b><br>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.     |
| <b>Materials and Maintenance</b><br>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     |         |
|  |       |         |

|                                       |  |   |  |
|---------------------------------------|--|---|--|
| <b>Performance of project outputs</b> | 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 22. The summary of public consultation meeting and number of participants

| No | Name of subprojects       | Location   | Date          | Participants |        |       |
|----|---------------------------|--|---------------|--------------|--------|-------|
|    |                           |  |               | Male         | Female | Total |
| 1  | 220 kV Duc Hoa substation | Tan My Commune, Duc Hoa District, Long An Province | 20 April 2015 | 10           | 4      | 14    |

### B.1: PUBLIC CONSULTATION OF TAN MY COMMUNE

#### a. LIST OF PARTICIPANTS

**Date (Ngày tháng) :** 20 April 2015

**Location (địa điểm) :** Tan My Commune, Duc Hoa District, Long An Province

| No. TT | Họ và tên (Name)     | Nam (M) | Nữ (F) | Chức vụ (Position) | Cơ quan/Địa chỉ (Organization/Address) | Chữ ký (Signature) |
|--------|----------------------|---------|--------|--------------------|--|--------------------|
| 1      | Phung Van Me         | X       |        |                    | Tan My Commune                         |                    |
| 2      | Pham Van Liem        | X       |        |                    |  |                    |
| 3      | Huynh Van Canh       | X       |        |                    |  |                    |
| 4      | Trinh Van Thieu      | X       |        |                    |  |                    |
| 5      | Trinh Van Chuong     | X       |        |                    |  |                    |
| 6      | Huynh Thi Thin       |         | X      |                    |  |                    |
| 7      | Le Thi Son           |         | X      |                    |  |                    |
| 8      | Huynh Van Duc        | X       |        |                    |  |                    |
| 9      | Huynh Van Truc       | X       |        |                    |  |                    |
| 10     | Huynh Thanh Binh     | X       |        |                    |  |                    |
| 11     | Tran Van Tu          | X       |        | Hamlet Head        | Bau Cong Hamlet                        |                    |
| 12     | Nguyen Dang Huy      | X       |        | Staff              | Land Administration                    |                    |
| 13     | Nguyen Thi Ngoc Huu  |         | X      | Chairperson        | Communal Women Union                   |                    |
| 14     | Duong Thi Huong Thao |         | X      | Vice chairperson   | Communal Youth Union                   |                    |
| 15     | Nguyen Minh Thoi     | X       |        | Vice Chairman      | Communal People's Committee            |                    |

**b. MINUTES OF MEETINGS AND PHOTOS- TAN MY 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  
\*\*\*

Long An, Ngày 20 tháng 4 năm 2015

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

Tiêu dự án: Lắp máy 2 trạm 220KV Diên Hòa  
Phường/Xã: Tân Mỹ, Quận/Huyện: Diên Hòa, Thành phố: Long An

**I. Thành phần tham dự**

|  |   |
|--|---|
| - Ông/Bà: <u>Nguyễn Minh Thái</u>          | Chức vụ: <u>PCT UBND xã</u>             |
| - Ông/Bà: <u>Nguyễn Đăng Huy</u>           | Chức vụ: <u>Chủ trì triển khai</u>      |
| - Ông/Bà: <u>Phạm Văn Tranh</u>            | Chức vụ: <u>BQL DA địa phương</u>       |
| - Ông/Bà: <u>Trần Minh</u>                 | Chức vụ: <u>Tư vấn ADB</u>              |
| - Ông/Bà: <u>Trần Thái Sơn</u>             | Chức vụ: <u>PECC 5</u>                  |
| - Ông/Bà: .....                            | Chức vụ: .....                          |
| - 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:** Vị trí trạm, tuyến đường; vị trí và chiều dài tuyến trên địa bàn phường, 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

**II. Ý kiến thảo luận**

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

- Đề nghị về các tác động môi trường và biện pháp giảm thiểu đề xuất trong báo cáo ĐTM
- Từ việc thực hiện lắp máy 1 của TDA, chú ý đầu tư và dọn dẹp thi công cần lưu ý:



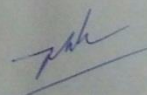
TA-7742 VIE: Power Transmission Investment Program (MFF)  
CHƯƠNG TRÌNH ĐƯỜNG DÂY TRUYỀN TẢI ĐIỆN (MFF)

- Quản lý chất thải rắn từ thi công và sinh hoạt của công nhân trong quá trình thi công
- Vấn đề phòng dịch của trạm trong mùa mưa có thể ảnh hưởng đến sức khỏe của người dân
- Hoàn nguyên tuyến đường thi công sau khi hoàn thành để trạm hoạt động sinh hoạt của người dân
- Giải toán vấn đề môi trường và vấn đề: chiến sự gây chặt lùa, chặt khai rớt bia bãi ra rừng, đất bị nhiễm phèn, nước thải xả ra rừng.

II.2 Về các vấn đề thu hồi đất và các tài sản trên đất và các chính sách

III. Kết luận

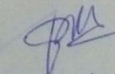
- Đồng ý với phương án thi công, tài động môi trường và các biện pháp giảm thiểu ảnh hưởng tại địa phương.
- Chủ đầu tư sẽ cam đoan, đảm bảo đời sống thi công và thực hành xử lý triệt để các tài động trong và sau khi thi công kết thúc.

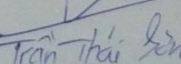
Đại diện Chủ đầu tư  
  
Phan Văn Tranh

Đại diện cộng đồng

Đại diện tư vấn

Đại diện UBND xã

  
Trần Minh

  
Trần Thái Sơn



Nguyễn Minh Thới



PUBLIC CONSULTATION ON ENVIRONMENT AND SOCIAL/RESETLEMENT  
 THAM VẤN CỘNG ĐỒNG VỀ MÔI TRƯỜNG VÀ  
 XÃ HỘI/TÁI ĐỊNH CƯ

LIST OF PARTICIPANTS  
 DANH SÁCH NGƯỜI THAM DỰ

Date (Ngày tháng): 20/4/2015

Location (địa điểm): Tân Mỹ, Đức Hòa, Long An

| No. TT | Họ và tên (Name)  | Nam (M) | Nữ (F) | Chức vụ (Position) | Cơ quan/Địa chỉ (Organization/Address) | Chữ ký (Signature) |
|--------|-------------------|---------|--------|--------------------|--|--------------------|
|        | Phung Văn Me      | X       |        |                    | Ban công - Tân Mỹ                      | <i>[Signature]</i> |
|        | Phạm Văn Kiên     | X       |        |                    | Ban Công - Tân Mỹ                      | <i>[Signature]</i> |
|        | Hàng Văn Cảnh     | X       |        |                    | Ban công Tân Mỹ                        | <i>[Signature]</i> |
|        | Đinh Văn Thiệu    | X       |        |                    | Ban Công Tân Mỹ                        | <i>[Signature]</i> |
|        | Trần Văn Chiến    |         |        |                    |  |                    |
|        | Trần Thị Sơn      |         | X      | Chủ tịch (F)       | Ban công                               | <i>[Signature]</i> |
|        | Phạm Văn Đức      |         |        |                    | Ban Công                               | <i>[Signature]</i> |
|        | Hàng Văn Đức      |         |        |                    | Ban Công                               | <i>[Signature]</i> |
|        | Trần Văn Bình     |         |        |                    | Ban Công                               | <i>[Signature]</i> |
|        | Nguyễn Văn Hùng   | X       |        | Chủ tịch           | Ban công Tân Mỹ                        | <i>[Signature]</i> |
|        | Kỳ Thị Ngọc Kiều  |         | X      | CT Hội Phụ Nữ      | Tân Mỹ                                 | <i>[Signature]</i> |
|        | Đường Thị H. Thảo |         | X      | Phụ tá Đoàn        |  | <i>[Signature]</i> |

C .PHOTOS – TAN MY COMMUNE



## APPENDIX C: EIA APPROVAL LETTER FOR 220 KV DUC HOA SUBSTATION

ỦY BAN NHÂN DÂN  
TỈNH LONG AN

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

Số: 111/QĐ-UBND

Long An, ngày 29 tháng 01 năm 2015

### QUYẾT ĐỊNH

Về việc phê duyệt báo cáo đánh giá tác động môi trường  
Dự án Lắp máy biến áp thứ 2 Trạm biến áp 220 kV Đức Hòa  
của Ban Quản lý Dự án Các công trình điện Miền Nam

#### ỦY BAN NHÂN DÂN TỈNH LONG AN

Căn cứ Luật tổ chức HĐND và UBND ngày 26 tháng 11 năm 2003;

Căn cứ Luật Bảo vệ môi trường ngày 23 tháng 6 năm 2014;

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 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;

Căn cứ Quyết định số 2437/QĐ-UBND ngày 12 tháng 10 năm 2006 của UBND tỉnh Long An về việc ủy quyền cho Sở Tài nguyên và Môi trường tiếp nhận hồ sơ và tổ chức thẩm định hồ sơ môi trường của các dự án đầu tư trên địa bàn tỉnh;

Theo đề nghị của Hội đồng thẩm định báo cáo đánh giá tác động môi trường họp ngày 4 tháng 12 năm 2014 tại Sở Tài nguyên và Môi trường tỉnh Long An;

Xét văn bản số 9725/AMN-ĐB ngày 31 tháng 12 năm 2014 của Ban Quản lý Dự án Các công trình điện Miền Nam;

Xét đề nghị của Giám đốc Sở Tài nguyên và Môi trường tại văn bản số 142/STNMT-CCBVMT ngày 23 tháng 01 năm 2015,

#### QUYẾT ĐỊNH:

**Điều 1.** Phê duyệt nội dung báo cáo đánh giá tác động môi trường của Dự án Lắp máy biến áp thứ 2 Trạm biến áp 220 kV Đức Hòa được lập bởi Ban Quản lý Dự án Các công trình điện Miền Nam (sau đây gọi là chủ dự án) với các nội dung chủ yếu sau đây:

**1. Phạm vi, quy mô, công suất của dự án:**

a) **Địa điểm:** ấp Bàu Công, xã Tân Mỹ, huyện Đức Hòa, tỉnh Long An.

b) **Công suất:** Trạm biến áp 220 kV.

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

a) Chủ dự án cần phải thực hiện các công trình khống chế ô nhiễm như đã giải trình trong báo cáo đánh giá tác động môi trường và những yêu cầu sau đây:

- Bụi, tiếng ồn phải được khống chế đạt quy chuẩn QCVN 05:2013/BTNMT, QCVN 26:2010/BTNMT.



- Nước thải phải được thu gom và xử lý đạt quy chuẩn QCVN 14:2008/BTNMT, cột B (K = 1,2) trước khi thải ra nguồn tiếp nhận.

Trường hợp có văn bản pháp luật quy định quy chuẩn mới thay thế hoặc bổ sung quy chuẩn hiện hành thì chủ dự án phải tuân thủ việc áp dụng các quy chuẩn mới.

b) Chất thải rắn phát sinh trong quá trình hoạt động chủ dự án có trách nhiệm thực hiện đúng theo Nghị định 59/2007/NĐ-CP ngày 09 tháng 4 năm 2007 của Chính phủ về quản lý chất thải rắn. Đối với chất thải nguy hại phát sinh từ các hoạt động của dự án phải thu gom, lưu giữ, vận chuyển và xử lý theo đúng quy định tại Thông tư số 12/2011/TT-BTNMT ngày 14 tháng 4 năm 2011 của Bộ Tài nguyên và Môi trường quy định về quản lý chất thải nguy hại.

c) Định kỳ 6 tháng/1 lần chủ dự án phải tiến hành đo đạc các thông số về nước thải và gửi báo cáo về Sở Tài nguyên và Môi trường.

**Điều 2.** Chủ dự án phải lập, phê duyệt và niêm yết công khai kế hoạch quản lý môi trường của dự án; nghiêm túc thực hiện các yêu cầu về bảo vệ môi trường trong giai đoạn chuẩn bị đầu tư và giai đoạn thi công xây dựng Dự án; lập hồ sơ đề nghị kiểm tra, xác nhận việc đã thực hiện các công trình, biện pháp bảo vệ môi trường phục vụ giai đoạn vận hành của Dự án gửi cơ quan có thẩm quyền để kiểm tra, xác nhận trước khi đưa dự án vào vận hành chính thức theo quy định tại Thông tư số 26/2011/TT-BTNMT ngày 18 tháng 7 năm 2011 của 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.

**Điều 3.** Trong quá trình thực hiện, nếu có những thay đổi so với các khoản 1 và 2 Điều 1 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 UBND tỉnh Long An.

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

**Nơi nhận:**

- CT, PCT.UBND tỉnh;
- Chủ dự án;
- Các Sở: Tài nguyên-Môi trường, Khoa học Công nghệ, Công Thương, Xây dựng, Y tế;
- UBND huyện Đức Hòa;
- Phòng TNMT huyện Đức Hòa;
- UBND xã Tân Mỹ;
- Phòng CSPCTP về môi trường;
- Lưu: VT, STNMT, Nh.

DTM-LAP MÁY BIẾN ÁP THỦ 2 ĐỨC HOA



Nguyễn Thanh Nguyên

**APPENDIX D: EMERGENCY RESPONSE PLAN**

111. 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 should 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 (DPH), collectively referred to as the External Emergency Response Team (EERT), as ultimate responders.

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

**Table 23. Roles and Responsibilities in Emergency Incident Response**

| <b>Entity</b>                           | <b>Responsibilities</b>   |
|---|---|
| Contractor Team (ERT)                   | <ul style="list-style-type: none"> <li>- Communicates / alerts the EERT.</li> <li>- Prepares the emergency site to facilitate the response action of the EERT, e.g., vacating, clearing, restricting site.</li> <li>- When necessary and requested by the EERT, lends support / provides assistance during EERT's response operations.</li> </ul>           |
| External Emergency Response Team (EERT) | <ul style="list-style-type: none"> <li>- Solves the emergency/incident</li> </ul>   |
| Contractor Resources                    | <ul style="list-style-type: none"> <li>- Provide and sustain the people, equipment, tools and funds necessary to ensure Subproject's quick response to emergency situations.</li> <li>- Maintain good communication lines with the EERT to ensure prompt help response and adequate protection, by keeping them informed of Subproject progress.</li> </ul> |

113. 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.

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

115. 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

116. 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.

117. 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.

118. 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.

### **Alert Procedures**

119. 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 should 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; iii) estimated magnitude of the situation; iv) estimated persons harmed; v) time it happened; vi) in case of a spill, which hazardous substance spilled; and vii) 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:
  - (i) The names and contact details of the relevant persons and institutions should 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
  - (ii) All Subproject sites should have good access to any combination of audible and visual alarms, landline phones, mobile phones and two-way radio communication at all times.
  - (iii) Contractor's construction vehicles should also be equipped with the appropriate communication facilities.

**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 24. Evacuation Procedure**

| Procedure   | Remarks  |
|---|--|
| <ul style="list-style-type: none"> <li>▪ Move out as quickly as possible as a group, but avoid panic.</li> </ul>                              | <ul style="list-style-type: none"> <li>▪ All workers/staff, sub-contractors, site visitors to move out, guided by the ERT.</li> </ul>  |
| <ul style="list-style-type: none"> <li>▪ Evacuate through the directed evacuation route.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ The safe evacuation shall have been determined fast by the ERTL/Deputy ERTL and immediately communicated to ERT members.</li> </ul> |
| <ul style="list-style-type: none"> <li>▪ Keep moving until everyone is safely away from the emergency site and its influence area.</li> </ul> | <ul style="list-style-type: none"> <li>▪ A restricted area must be established outside the emergency site, all to stay beyond the restricted area.</li> </ul>                |
| <ul style="list-style-type: none"> <li>▪ Once outside, conduct head counts.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Foremen to do head counts of their sub-groups; ERTL/Deputy ERTL of the ERT.</li> </ul>  |
| <ul style="list-style-type: none"> <li>▪ Once outside, conduct head counts.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Foremen to do head counts of their sub-groups; ERTL/Deputy ERTL of the ERT.</li> </ul>  |
| <ul style="list-style-type: none"> <li>▪ Report missing persons to EERT immediately.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ ERTL/Deputy ERTL to communicate with the EERT.</li> </ul>   |

| <b>Procedure</b>   | <b>Remarks</b>  |
|--|---|
| <ul style="list-style-type: none"> <li>▪ Assist the injured in evacuation and hand them over to the ERT first-aiders or EERT medical group</li> </ul>        | <ul style="list-style-type: none"> <li>▪ ERT to manage injured persons to ensure proper handling.</li> </ul>  |
| <ul style="list-style-type: none"> <li>▪ If injury warrants special care, DO NOT MOVE them, unless necessary and instructed/directed by the EERT.</li> </ul> | <ul style="list-style-type: none"> <li>▪ ERTL/Deputy ERTL communicates with EERT to get instructions/directions in handling the injured.</li> </ul> |

**Table 25. Response Procedure During Medical Emergency**

| <b>Procedure</b>   | <b>Remarks</b>   |
|--|--|
| <ul style="list-style-type: none"> <li>▪ Administer First Aid regardless of severity immediately.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Fundamentals when giving First Aid: <ul style="list-style-type: none"> <li>- Safety first of both the rescuer and the victim.</li> <li>- Do not move an injured person unless: <ul style="list-style-type: none"> <li>- victim is exposed to more danger when left where they are, e.g., during fire, chemical spill</li> <li>- it would be impossible for EERT to aid victims in their locations, e.g., under a collapsed structure</li> </ul> </li> <li>- instructed or directed by the EERT.</li> </ul> </li> <li>▪ First AID to be conducted only by a person who has been properly trained in giving First Aid.</li> </ul> |
| <ul style="list-style-type: none"> <li>▪ Call the EERT emergency medical services and/or nearest hospital.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ ERTL/Deputy ERTL or authorized on-site emergency communicator</li> </ul>  |
| <ul style="list-style-type: none"> <li>▪ Facilitate leading the EERT to the emergency site.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ ERTL/Deputy ERTL to instruct: <ul style="list-style-type: none"> <li>- 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.</li> <li>- Other ERT members to clear access road for smooth passage of the EERT.</li> </ul> </li> </ul>  |
| <ul style="list-style-type: none"> <li>▪ If applicable, vacate site and influence area at once, restrict site, suspend work until further notice.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Follow evacuation procedure.</li> </ul>   |

**Table 26. Response Procedure in Case of Fire**

| <b>Procedure</b>  | <b>Remarks</b>   |
|---|--|
| <ul style="list-style-type: none"> <li>▪ Alert a fire situation.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Whoever detects the fire shall immediately: <ul style="list-style-type: none"> <li>- call the attention of other people in the</li> </ul> </li> </ul> |

| Procedure   | Remarks  |
|---|--|
|   | site,<br><ul style="list-style-type: none"> <li>- sound the nearest alarm, and/or</li> <li>- Foreman or any ERT member among the construction sub-group contacts the fire department (in this case it should be agreed on that it is alright for any ERT member in the sub-group to alert the fire department)</li> <li>- report/communicate the emergency situation to the ERTL/Deputy ERTL.</li> </ul>   |
| <ul style="list-style-type: none"> <li>▪ Stop all activities/operations and evacuate.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ All (non-ERT) workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.</li> </ul>  |
| <ul style="list-style-type: none"> <li>▪ Activate ERT to contain fire/control fire from spreading.</li> </ul>                                 | <ul style="list-style-type: none"> <li>▪ 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.</li> </ul>   |
| <ul style="list-style-type: none"> <li>▪ Call the nearest fire and police stations and, if applicable, emergency medical services.</li> </ul> | <ul style="list-style-type: none"> <li>▪ When alerting the EERT, ERTL will give the location, cause of fire, estimated fire alarm rating, any injuries.</li> </ul>   |
| <ul style="list-style-type: none"> <li>▪ Facilitate leading the EERT to the emergency site.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ ERTL/Deputy ERTL to instruct:               <ul style="list-style-type: none"> <li>- 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.</li> <li>- some ERT members to stop traffic in, and clear, the access road to facilitate passage of the EERT.</li> </ul> </li> </ul> |
| <ul style="list-style-type: none"> <li>▪ ERT to vacate the site as soon as their safety is assessed as in danger.</li> </ul>                  | <ul style="list-style-type: none"> <li>▪ Follow appropriate evacuation procedure.</li> </ul>   |

## APPENDIX E: ENVIRONMENTAL COMPLIANCE AUDIT OF DUC HOA SUBSTATION

### ENVIRONMENTAL COMPLIANCE AUDIT for present day operations at 220 kV Duc Hoa Substation, Long An Province

#### SUBSTATION INFORMATION

|                                       |   |
|---------------------------------------|---|
| Name and Type of facility:            | 220 kV Duc Hoa Substation   |
| Name of Operating Power Company:      | The Power Transmission Company of HCMC under Power Transmission Company No.4 (PTC4) |
| Location:                             | Tan My Commune, Duc Hoa District, Long An Province                                  |
| Capacity of substation:               | 220kV/110kV   |
| No. of connecting transmission lines: |   |
| <b>Transmitting power to:</b>         |   |
| -                                     | Duc Hoa 110/22kV Substation through Duc Hoa connector point                         |
| -                                     | Phu Lam 110/22kV Substation   |
| -                                     | Trang Bang 110/22kV Substation  |
| -                                     | Duc Hue 110/22kV Substation   |
| <b>Receiving power from:</b>          |   |
| -                                     | The 500 kV Cau Bong Substation  |

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

#### ENVIRONMENTAL COMPLIANCE CHECKLIST

| No.                                | Item  | Yes | No | Remarks  |
|------------------------------------|---|-----|----|--|
| <b>1. Maintenance of Equipment</b> |   |     |    |  |
| 1                                  | Is there an oil containment area around transformers?   | x   |    | Oil Tank Volume: 45m <sup>3</sup>  |
| 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                       |
| <b>2. Waste Management</b>         |   |     |    |  |
| 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  | X   |    |  |

| No.  | Item  | Yes | No | Remarks  |
|--|---|-----|----|--|
|  | regulated organization?   |     |    |  |
| 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   |
| 6  | Has the SS domestic wastewater treatment facilities? Describe             | x   |    | The operation of the substation creates 1.13m <sup>3</sup> 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 noise? Describe                      |     | x  | The transformer is designed to work silently. Noise measured at the running transformer is 49.56dBA lower than the limit of 70dBA required in technical regulation on noise<br>QCVN26:2010/BTN MT        |
| 8  | Has the SS the facilities to prevent dust? Describe                       |     | x  | Minimal amount of dust created during operation  |
| <b>3. Health and Safety</b>                |   |     |    |  |
| 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   |    |  |
| <b>4. Permits and license/s to operate</b> |   |     |    |  |
| 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   |    |  |
| <b>5. EMF monitoring conducted</b>         |   |     |    |  |
|  | 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   |



| No.                              | Item                        | Yes | No | Remarks   |
|----------------------------------|-----------------------------|-----|----|---|
|                                  |                             |     |    | which do not exceed 8 hours each and workers will be examined for EMF exposure once a year. |
| <b>6. Air quality monitoring</b> |                             |     |    |   |
|                                  | Is noise level met standard | x   |    |   |
|                                  | Is dust level met standard  | x   |    |   |

#### Air quality at/near Duc Hoa substation including EMF

- Sampling locations: outside and within the substation
- Date of sampling: September 2014
- Laboratory: Sac Ky Hai Dang Scientific Services Joint Stock Company (EDC-HD)

**Table 1: Air Quality at Cau Bong Substation**

| Location                                 | Temp. (°C) | Noise (dA) | Pollutant concentration (mg/m <sup>3</sup> ) |                 |                 |           |
|--|------------|------------|--|-----------------|-----------------|-----------|
|  |            |            | Dust   | SO <sub>2</sub> | NO <sub>2</sub> | CO        |
| On access road at gate of the Substation | 31.2       | 58–60      | 0.142  | 0.012           | 0.032           | 20        |
| Inside the existing Substation           | 30.9       | 61–62      | 0.24   | 0.023           | 0.051           | 16        |
| <b>QCVN05:2013/<br/>BTNMT</b>            | -          | -          | <b>0.3</b>                                   | <b>0.35</b>     | <b>0.2</b>      | <b>30</b> |
| <b>QCVN26:2010/<br/>BTNMT</b>            | -          | <b>≤70</b> | -  | -               | -               | -         |

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

#### Wastewater in Duc Hoa substation

Sampling location: at discharging gate after treatment

- Date of sampling: September 2014
- Laboratory: Sac Ky Hai Dang Scientific Services Joint Stock Company (EDC-HD)

**Table 2: Waste water quality at Duc Hoa Substation**

| No | Parameter | Unit | Result | QCVN14:2008/BTNMT<br>Colum B |
|----|-----------|------|--------|------------------------------|
| 1  | pH        | -    | 6.6    | 5– 9                         |

|   |                            |        |       |              |
|---|----------------------------|--------|-------|--------------|
| 2 | Total suspended solid(TSS) | mg/l   | 95    | <b>100</b>   |
| 3 | COD                        | mg/l   | 2     | <b>15</b>    |
| 4 | BOD5                       | mg/l   | 1     | <b>50</b>    |
| 5 | Nitrate                    | mg/l   | 4.7   | <b>50</b>    |
| 6 | Phosphate                  | mg/l   | 0.3   | <b>10</b>    |
| 7 | Coliform                   | MPN/ml | 4,000 | <b>5,000</b> |

Notes: Most sampled parameters, except for COD, 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.

**Corrective Action Plan:** 220 kV Duc Hoa substation is a newly commissioned substation that is still under construction, and operating according to required Viet Nam laws and regulations. No corrective action required.

**CERTIFICATE OF ENVIRONMENTAL PROTECTION COMMITMENT FOR DUC HOA SUBSTATION**  
Duc Hoa District People's Committee

**Socialist Republic of Vietnam**  
**Independence- Freedom –Happiness**

No: 597/ GXN-UBND

Duc Hoa, March 19, 2008

**CERTIFICATE**  
**ENVIRONMENTAL PROTECTION COMMITMENT**  
**For The Project: 220 kV Duc Hoa Substation and 220kV, 110kV connecting lines of Southern Power**  
**Project Management Board in Bau Cong Hamlet, Tan My Commune, Duc Hoa District, Long An**  
**Province**

**CHAIRMAN OF DUC HOA DISTRICT PEOPLE'S COMMITTEE**  
**CERTIFIES**

**Article 1.** On March 15, 2008, the Southern Power Project Management Board as Project Owner submitted Document no.0793/CV-AMN-PDB dated February 26, 2008 to register the Environment Protection Commitment of 220 kV Duc Hoa Substation and 220kV, 110kV connecting lines to be constructed in Bau Cong Hamlet, Tan My Commune, Duc Hoa District, Long An 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:

- Environment Division (DONRE)
- District People's Committee
- District Division of Natural Resources and Environment (7b)
- Southern Power Project Management Board
- Communal People's Committee
- For internal storing

ON BEHAFT OF DPC CHAIRMAN  
VICE CHAIRMAN

Nguyen DacKhanh

Signed and Sealed

ỦY BAN NHÂN DÂN  
HUYỆN ĐỨC HOÀ

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

Số: 597/GXN-UBND

Đức Hòa, ngày 19 tháng 3 năm 2008.

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

**BẢN SAO**

**Dự án:** trạm biến áp 220/110KV Đức Hoà và các đường dây 220, 110 KV đấu nối của Ban Quản Lý Dự Án các công trình điện Miền Nam, địa chỉ ấp Bàu Công, xã Tân Mỹ, huyện Đức Hòa, tỉnh Long An.

ỦY BAN NHÂN DÂN HUYỆN ĐỨC HOÀ  
XÁC NHẬN.

**Điều 1:** Ngày 15/03/2008 chủ dự án là Ban Quản Lý Dự Án các công trình điện Miền Nam có văn bản số 0793/CV-AMN-PĐB ngày 26/02/2008 về việc đề nghị xác nhận đăng ký bản cam kết bảo vệ môi trường của dự án: trạm biến áp 220/110KV Đức Hoà và các đường dây 220, 110 KV đấu nối địa chỉ ấp Bàu Công, xã Tân Mỹ, huyện Đức Hòa, tỉnh Long An.

**Điều 2:** Ban Quản Lý Dự Án các công trình điện Miền Nam 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 ./.

Nơi nhận :

- P.môi trường (sở TN&MT)
- UBND Huyện ;
- Phòng TN&MT(7b) ;
- Ban Quản Lý Dự Án các công trình điện Miền Nam;
- UBND Huyện;
- Lưu.

**CHỮNG THỰC BẢN SAO ĐỒNG VỚI BẢN CHÍNH**  
Số chứng thực 04440 Quyền số 02 SGT/BS

Ngày 30-03-2015  
Phó Chủ tịch UBND phường 4 quận 5



Lê Thị Ngọc Dung

TM.ỦY BAN NHÂN DÂN HUYỆN.

K/ CHỦ TỊCH

PHÓ CHỦ TỊCH



Nguyễn Đức Khánh

## **APPENDIX F:HEALTH EFFECTS OF ELECTROMAGNETIC RADIATION EMF**

120. 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.

121. 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.

122. 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 electromagnetic fields. However, it is believed that some gaps in knowledge about biological effects exist and need further research.

### **Effects on general health:**

123. Some members of the public have attributed a diffuse collection of symptoms to low levels of exposure to electromagnetic fields 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 electromagnetic fields. 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.

### **Effects on pregnancy outcome**

124. Many different sources and exposures to electromagnetic fields 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 electromagnetic fields, 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).

### **Cataracts**

125. 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.

### **Electromagnetic fields and cancer**

126. Despite many studies, the evidence for any effect remains highly controversial. However, it is clear that if electromagnetic fields do have 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.

127. A number of epidemiological studies suggest small increases in risk of childhood leukemia with exposure to low frequency magnetic fields 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.

### **Electromagnetic hypersensitivity and depression**

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

129. 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 electromagnetic field 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.

### **The focus of current and future research**

130. Much effort is currently being directed towards the study of electromagnetic fields 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.

131. 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.

#### **a. 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 environments, 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 electromagnetic fields can be harmful to health. Current public concern focuses on possible long-term health effects caused by exposure to electromagnetic fields 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 electromagnetic fields.
- Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health.
- The focus of international research is the investigation of possible links between cancer and electromagnetic fields, 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.

**Repacholi MH (ed) (1998)** Low-level exposure to radiofrequency electromagnetic fields: health effects and research needs. *Bioelectromagnetics*, 19:1-19.

**McKinlay AF and Repacholi MH (eds) (1999)** Exposure metrics and dosimetry for EMF epidemiology. *Radiation Protection Dosimetry*, 83(1-2):194.

**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.

**Kheifets L (2001)** Electric and magnetic field exposure and brain cancer. *Bioelectromagnetics* 5: S120-S131.

**Kheifets L (2001)** Electric and Magnetic Fields and Occupational Health. *Patty's Industrial Hygiene and Toxicology*, Fifth Edition 100: 141-198.

**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.

**Kheifets L, Hester G, Banerjee G (2001)** The Precautionary Principle and EMF: Implementation and Evaluation. *Journal of Risk Research* 4(2): 113-125.

**Mezei G, Kheifets L (2001)** "Is There any Evidence for Differential Misclassification or Bias Away from the Null in the Swedish Childhood Cancer Study?" Letter to the Editor, *Epidemiology* 12(6):750.

**Repacholi MH (2001)** Health risks from the use of mobile phones. *Toxicology Letters* 120: 323-331.

**Foster KR, Osepchuk JM, and Repacholi MH (2002)** Environmental impacts of electromagnetic fields from major electrical technologies. *Environmental Health Perspectives*

- Goldstein LS, Kheifets L, van Deventer TE, Repacholi MH (2002)** Comments on the paper "Long-term exposure of Em -Pim1 transgenic mice to 898.4 MHz microwaves does not increase lymphoma incidence" *Radiation Research* 158: 357-364.
- Goldstein LS, Kheifets L, van Deventer TE, Repacholi MH (2002)** Further comments on "Long-term Exposure of E&mgr;-Pim1 Transgenic Mice to 898.4 MHz Microwaves Does Not Increase Lymphoma Incidence" by Utteridge et al., *Radiation Research* 158, 357-364 (2002)
- Kheifets L, Thrall N (2002)** Electromagnetic Fields and Health. *Macmillians Guide to Pollution*
- Litvak E, Foster KR, and Repacholi MH (2002)** Health and safety implications of exposure to electromagnetic fields 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
- McKinlay A, Repacholi MH (2003)** (eds) Weak electric fields effects in the body. *Radiation Protection Dosimetry* 106 (4) 2003
- Repacholi MH (2003)** WHO's health risk assessment of ELF fields. *Radiation Protection Dosimetry*, 106(4):297-299
- Riadh W. Habash Y, Brodsky LM, Leiss W, Krewski D, Repacholi MH (2003)** Health Risks of Electromagnetic Fields. Part I: Evaluation and Assessment of Electric and Magnetic Fields. *Critical Review in Biomedical Engineering*, 31(3&4):219-273
- van Deventer TE, Repacholi MH (2004)** Effet de la Téléphonie mobile su la santé humaine: état des connaissances scientifiques, *Droit de l'environnement dans la pratique*, 8, 708-724
- Kheifets L, Repacholi M, Saunders R, van Deventer TE (2005)** Sensitivity of Children to Electromagnetic Fields, *Pediatrics*, August 2005, 303-313
- Kheifets L, Sahl J, Shimkhada R, Repacholi MH (2005)** Developing policy in the face of scientific uncertainty: interpreting 0.3 µT or 0.4 µT cut points from EMF epidemiologic studies, *Risk Analysis*, 25 (4), vol. 5, no.1, 927-935



- van Deventer TE, Saunders R, Repacholi MH (2005)** WHO health risk assessment process for static fields, *Progress in Biophysics and Molecular Biology*, 87, 355-363
- Kheifets L, van Deventer TE, Lundel G, Swanson J (2006)** Le principe de précaution et les champs électriques et magnétiques : mise en œuvre et évaluation, *Environnement, risques et santé*, Jan-Feb 2006, 43-53
- vanRongen E, Saunders R, van Deventer TE, Repacholi MH (2006)** Static fields: Biological effects and mechanisms relevant to exposure limits. *Health Physics*, June 2007, vol. 92, no. 6, 584-590
- Valberg P, van Deventer TE, Repacholi MH (2007)** Workgroup Report: Base Stations and Wireless Networks: Radiofrequency (RF) Exposures and Health Consequences. *Environmental Health Perspectives*, March 2007, vol. 115, no. 3, 416-424
- van Deventer TE, Simunic D, Repacholi MH (2007)** EMF standards for human health, chapter in *Handbook of Biological Effects of Electromagnetic Fields*, 3rd ed., Biological and Medical Aspects of Electromagnetic Fields, F. Barnes and B Greenebaum, eds., 277-292
- van Deventer E, Foster K (2008)** Risk Assessment and Risk Communication for Electromagnetic Fields: A World Health Organization Perspective, chapter in book *The Role of Evidence in Risk Characterization: Making Sense of Conflicting Data*, P. Wiedemann and H. Schütz, eds., WILEY-VCH, 13-24